

FIFTY-SIXTH ANNUAL REPORT
OF THE
DEPARTMENT OF MARINE
AND FISHERIES

FOR THE

FISCAL YEAR 1922-23

MARINE

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OTTAWA
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1923

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*To General His Excellency the Right Honourable Lord Byng of Vimy, G.C.B.,
G.C.M.G., M.V.O., Governor General and Commander in Chief of the
Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith, for the information of Your Excellency and the Parliament of Canada, the Fifty-sixth Annual Report of the Department of Marine and Fisheries, Marine Branch.

I have the honour to be,

Your Excellency's most obedient servant,

ERNEST LAPOINTE,
Minister of Marine and Fisheries.

DEPARTMENT OF MARINE,
OTTAWA, 1923.

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REPORT

OF THE

DEPUTY MINISTER OF MARINE AND FISHERIES

To the Honourable ERNEST LAPOINTE,
Minister of Marine and Fisheries.

SIR,—I have the honour to submit herewith my report for the fiscal year ended March 31, 1923.

On March 31, 1922 (Lloyd's statement) there were 2,235,998 gross tons of shipping, comprising ships of 100 gross tons and upwards, under construction in the United Kingdom, and in the other countries (excluding Germany) 1,443,624 gross tons, making a total of 3,679,622 gross tons of world shipping in hand at that time.

In last year's report reference was made to the decline in the volume of world shipbuilding, due largely to the heavy falling off in shipbuilding activity in the United States, and to a lesser extent to the decreased outputs in the United Kingdom and Dominions, and in Japan.

These decreases in the outputs of the leading maritime nations were somewhat offset by the increased outputs of the continental nations. Holland, France, and Italy established new shipbuilding records for their respective countries, and Spain and the Scandinavian countries surpassed their tonnages of the previous year.

An interesting feature of continental building in 1921 was the reappearance of Germany in the field, with 242 vessels of 509,064 tons as her contribution to the world's supply of overseas shipping.

At the beginning of 1922 Lloyds put the total shipbuilding orders in hand at 4,457,000 gross tons. There has therefore been in the first three months of 1922 a drop of 777,378 tons in world shipping under construction, and of the March total of 3,679,622 tons work has been suspended on about 942,000 tons of shipping, of which 177,000 tons were being built in Italy, the remainder in the United Kingdom; failing the resumption of this suspended work, the actual decrease of shipping in hand for the first three months of 1922 amounts to 1,719,378 tons, an average decline of nearly 600,000 tons a month.

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SIZE of Steamers and Motor Vessels under Construction, June 30, 1922

Country where building	Under 2,000	2,000 to 3,999 tons	4,000 to 5,999 tons	6,000 to 7,999 tons	8,000 to 9,999 tons	10,000 to 14,999 tons	15,000 to 19,999 tons	20,000 tons and above	Total
Belgium.....	6				1				7
British Dominions.....	12	5		1		1			19
Denmark.....	13	7	1	2					22
France.....	10	15	10	12	1	4			35
Holland.....	63	16	5	9	5	1			99
Italy.....	31	6	16	18				2	73
Japan.....	5	8	4	7	1	1			26
Norway.....	29	2	2						33
Spain.....	3	4		2		2			11
Sweden.....	10	4	4						18
United Kingdom.....	137	33	68	73	33	17	15	5	381
United States of America.....	12	5	2	3	2	3	2		29
Other countries.....	27	2							29
Total.....	358	107	112	127	43	29	17	7	800

NATIONALITY of Vessels under Construction in the United Kingdom, June 30, 1922

Countries for which intended	No.	Gross Tonnage
United Kingdom.....	286	1,437,966
Argentina.....	4	4,850
Belgium.....	4	11,260
British Dominions.....	11	37,756
Chili.....	2	14,000
Denmark.....	1	4,850
France.....	15	88,660
Greece.....	2	8,850
Holland.....	12	135,041
Italy.....	1	18,017
Japan.....	3	17,600
Norway.....	3	6,625
Poland.....	1	1,200
Roumania.....	3	2,460
Spain.....	1	4,400
Sweden.....	1	5,170
For sale, or Flag not stated.....	40	120,799
Total.....	390	1,919,504

TANKERS under Construction, of 1,000 tons and over, June 30, 1922

Country of Build	No.	Gross Tonnage
Fiume.....	2	3,284
France.....	5	32,200
Holland.....	2	8,633
Italy.....	6	35,693
Japan.....	1	6,000
United Kingdom.....	60	383,221
United States of America.....	6	60,880
Total.....	82	529,911

VESSELS Launched during the Quarter ended June 30, 1922

Countries	Steamers		Motor Vessels		Sailing Vessels		Total	
	No.	Gross tons	No.	Gross tons	No.	Gross tons	No.	Gross tons
Belgium.....	1	1,780	.....	.....	.....	.....	1	1,780
British Dominions.....	6	17,165	.....	.....	3	1,435	9	18,600
China.....	5	6,002	.....	.....	.....	.....	5	6,002
Denmark.....	5	8,765	1	7,100	.....	.....	6	15,865
Esthonia.....	3	1,147	.....	.....	5	1,390	8	2,537
France.....	13	59,069	.....	.....	.....	.....	13	59,069
Holland.....	17	49,313	.....	.....	.....	.....	17	49,313
Italy.....	5	19,474	1	2,000	5	1,368	11	22,842
Japan.....	6	15,840	.....	.....	.....	.....	6	15,840
Norway.....	4	6,000	.....	.....	.....	.....	4	6,000
Spain.....	1	2,300	.....	.....	.....	.....	1	2,300
Sweden.....	.....	.....	2	7,975	1	375	3	8,350
United Kingdom.....	33	139,312	3	9,294	1	280	37	148,886
United States of America.....	7	30,292	2	700	4	1,384	13	32,376
Total.....	106	356,459	9	27,069	19	6,232	134	389,760

World merchant tonnage under construction on June 30, 1921, amounted to 6,199,000 gross tons, a year later to 3,235,430 tons (Lloyd's estimate), a drop of 2,963,570 tons.

In the 1921 returns a little over 1,000,000 tons of shipping were included in the United Kingdom total on which work had been suspended, and in the 1922 returns about 771,000 tons of shipping on which work had been suspended, has been included; of this 481,000 tons were being built in the United Kingdom, and 122,000 tons in Italy.

A comparison of the June, 1922, quarterly returns of shipping in hand with the March returns shows increases in the cases of only two countries, viz: Norway with an increase of about 4,000 tons, and the United States with one of about 14,000 tons. Belgium, Brazil, and Esthonia are unaffected, and all the other countries show decreases, the decline in the United Kingdom being 316,494 tons.

German returns for the June, 1922, quarter are not given by Lloyds, exact data not being obtainable; Lloyds, however, gives as an estimate about 500,000 tons of shipping under construction in Germany at that time, and 45,000 tons at Danzig. As Germany's output of shipping for 1921 was 509,064 tons, it will be seen that she is about maintaining her 1921 rate of building.

In the size of ships under construction Britain has five of 20,000 tons and over, against Italy's two; fifteen of 15,000 tons to 20,000 tons against United States' two; and seventeen of 10,000 to 15,000 tons against France's four.

In 1921 United States launched 92 tankers of 1,000 tons and upwards, total tonnage 690,308; the United Kingdom 38, total tonnage 250,858. On June 30, 1922, United Kingdom had 60 tankers under construction, total tonnage 383,221; United States six, tonnage 60,880.

Of the United Kingdom 1,919,504 tons of shipping in hand on June 30, 1922, 481,538 tons were for foreign owners, or about 25 per cent. Holland, France, and the British Dominions were Britain's chief customers in the order named.

In the table of tonnage launched during the quarter ended June 30, 1922, the figures for Germany are not given; Lloyds, however, estimates German launchings during this period at about 150,000 tons, which is slightly in excess of the United Kingdom launchings, 148,886 tons, and two and one-half times those of France, the next in order, 59,069 tons; Germany thus for the time being was on a par with Britain as the leading shipbuilding nation.

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SEA-GOING Steel and Iron Steamers and Motor Vessels Owned by the Principal Maritime Countries (Lloyd's statement)

Country	June, 1914	June, 1922	Difference between 1922 and 1914
	Gross tons	Gross tons	Gross tons
United Kingdom.....	18,877,000	19,053,000	+176,000
British Dominions.....	1,407,000	2,201,000	+794,000
America (United States).....	1,837,000	12,506,000	+10,669,000
Austria-Hungary.....	1,052,000	Nil.	
Denmark.....	768,000	944,000	+176,000
France.....	1,918,000	3,303,000	+1,385,000
Germany.....	5,098,000	1,783,000	-3,315,000
Greece.....	820,000	653,000	-167,000
Holland.....	1,471,000	2,613,000	+1,142,000
Italy.....	1,428,000	2,600,000	+1,172,000
Japan.....	1,642,000	3,325,000	+1,683,000
Norway.....	1,923,000	2,337,000	+414,000
Spain.....	883,000	1,187,000	+304,000
Sweden.....	992,000	996,000	+4,000
Other countries.....	2,398,000	3,301,000	+903,000
World's total.....	42,514,000	56,802,000	+14,288,000

The pre-war tonnage of Austria-Hungary, of roughly 1,000,000 tons, has been wiped out. Germany and Greece excepted, all other countries show increases in their tonnages many of them substantial ones. United States tonnage has increased by 10½ millions, Japan's by 1,683,000 tons, France's by 1,385,000 tons, Italy's by 1,172,000 tons, and Holland's by 1,142,000 tons.

United Kingdom tonnage shows the slight increase of 176,000 tons due more to allocation of ex-enemy tonnage, than to new construction, the increased tonnages of France and Italy also include a certain amount of ex-enemy tonnage.

The relative positions of the chief maritime nations have materially altered since 1914. In 1914 United Kingdom held 45.5 per cent of world tonnage, in 1922, 33.5 per cent. In 1914 United States owned 4.3 per cent of world tonnage, in 1922, 22 per cent.

Norway which occupied the third place among maritime nations in 1914 has dropped to the seventh place, largely owing to the heavy submarine losses suffered by her merchant marine during the war. Japan which occupied the sixth place in 1914 is now third, France immediately following in the fourth position which she also occupied in 1914.

It will be seen that Germany's tonnage is just a trifle over one-third of her 1914 total, should she, however, maintain her present rate of building of about 500,000 tons a year, in the course of six or seven years, she will have regained here pre-war maritime strength. A point to be remembered is that the present German tonnage is largely modern, containing few obsolete ships; its effective working strength is therefore considerably greater than appears from the mere figures.

A summary of the June, 1922, position of the world's overseas steamship tonnage as compared with that of June 1914 is as follows:—

Increase in the United Kingdom.....	176,000 tons
Increase in the United States.....	10,669,000 "
Increase in other countries.....	7,810,000 "
Total.....	18,655,000 "
Loss to Germany.....	3,315,000 "
Ex-Austro-Hungarian tonnage.....	1,052,000 "
Total.....	4,367,000 "
Net world's increase since 1914.....	14,288,000 "

As compared with world tonnage of June, 1914, that of June, 1920, had increased by 8,501,000 tons, of June, 1921, by 11,703,000 tons, and of June, 1922, by 14,288,000 tons.

This progressive increase is due in part to the sustained building activities of the Continental countries; these are evidently bent on securing their share of the world's sea carrying trade, or at any rate of substituting as far as possible their own ships for foreign ships in the carriage of their own imports and exports, even at the risk of augmenting the already keen competition in sea transport.

SHIPPING LAID UP ON JUNE 30, 1922

The following table is taken from the report of the United States Commissioner of Navigation to the Secretary of Commerce for the fiscal year ended June 30, 1922.

Country	Gross tons	Per cent
United States, excluding Great Lakes.....	5,762,205	33.9
United Kingdom.....	1,600,000	7.2
France.....	1,200,000	31.2
Italy.....	585,000	20.4
Netherlands.....	330,000	12.5
Norway.....	112,000	4.3
Greece.....	100,000	14.0
Japan.....	79,000	2.2
Sweden.....	7,132	0.7

It will be seen that the country suffering the least from the present congestion of shipping is Sweden with less than one per cent of her merchant fleet tied up, then come Japan, Norway, and the United Kingdom, in the order named, the last with about 7 per cent of her shipping out of commission.

The heaviest sufferers by far are the United States with more than one-third of her shipping laid up, and France with nearly one-third.

Of the 5,762,205 tons laid up in United States, 4,967,577 tons was under the control of the Shipping Board, 64.6 per cent of the entire Shipping Board tonnage, and 794,628 tons under private ownership, 8.5 per cent of the tonnage so owned. These figures are significant, as showing the marked difference between Government and private ownership.

The United States Great Lakes and rivers shipping laid up amounted to 29 ships of 108,663 gross tons out of a total of roughly 3,000,000 tons, about 3 per cent.

MERCANTILE SHIPBUILDING IN 1922

These returns are from Lloyd's Register Annual Summary, are in gross tons, and comprise only merchant ships of 100 gross tons or upwards.

GREAT BRITAIN AND IRELAND

The tonnage launched during 1922 was 1,031,081; 1,024,541 tons less than the record figures for 1920.

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TABLE Showing the Countries for which the Merchant Vessels launched in Great Britain and Ireland during 1922 have been built.

Countries for which intended	No.	Gross tonnage
Great Britain and Ireland.....	188	762,769
British Dominions.....	9	33,092
Chili.....	2	14,578
France.....	7	43,757
Greece.....	1	3,780
Holland.....	10	97,600
Italy.....	1	18,000
Japan.....	2	10,306
Norway.....	2	8,415
Roumania.....	2	1,293
Spain.....	9	26,715
Sweden.....	1	5,223
For Sale or Flag not stated.....	1	5,553
Total.....	235	1,031,081

Of the total tonnage launched in Great Britain and Ireland in 1922, 268,312 tons were for foreign owners, or about 26 per cent.

Holland, Spain, the British Dominions, and France were Britain's chief customers in the order named.

The returns show that 91 vessels of between 5,000 and 10,000 tons each, and 17 vessels of 10,000 tons and upwards were launched. The following are the six largest:—

Franconia.....	20,000 tons.
Conte Verde.....	18,000 “
Doric.....	16,300 “
Mongolia.....	15,550 “
Veendam.....	15,434 “
Volendam.....	15,434 “

Excluding vessels of less than 1,000 tons, 35 vessels with a gross tonnage of 219,000 tons have been launched which were built on the Isherwood system of longitudinal framing. Including 34 of these vessels with a tonnage of 212,000 tons 42 vessels of about 263,000 tons have been built for the carriage of oil in bulk.

The average tonnage of steamers and motor-vessels launched in Great Britain and Ireland, excluding vessels of less than 500 tons reaches 5,186 tons.

During 1922, 50 vessels with a total tonnage of 443,879 tons were launched which will be fitted with steam turbines, and all of them with geared turbines.

During the year 17 motor vessels of 78,341 tons have been launched, and 9 of them are of 5,000 tons and upwards, the largest being of about 9,500 tons.

The tonnage launched in England and Wales amounted to 501,859 tons, in Scotland 435,203 tons, and in Ireland 94,019 tons.

The leading shipbuilding centres were, Glasgow with 270,639 tons, and Newcastle with 240,788 tons.

GERMANY

During the year under review 195 vessels of 575,264 tons were launched in German yards. For the purpose of convenience of comparison with the output of pre-war years these figures comprise the 8 vessels of 49,435 tons launched at Danzig including the *Columbus* of 35,000 tons building by the Schichau firm, the largest vessel launched in the world during 1922.

The present figures represent 23½ per cent of the total world output during 1922.

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Apart from vessels of less than 1,000 tons, these figures include 21 vessels of 113,576 tons to be fitted with steam turbines and 12 vessels of 45,513 tons to be fitted with oil engines.

The totals comprise 29 vessels of between 4,000 and 6,000 tons, 20 of between 6,000 and 10,000 tons, and 5 vessels of 10,000 tons and upwards, including the *Columbus*, and a steamer of about 20,000 tons building at Hamburg.

FRANCE

The output for the year was 184,509 tons, and with the exception of 1921 is the highest reached since 1902, which was the previous record year that total, however, included over 146,000 tons of sailing vessels.

The total figures include 4 steamers of between 4,000 and 6,000 tons, 11 of between 6,000 and 10,000 tons, one of 10,741 tons, and one turbine-engined vessel of 13,800 tons, built at Bordeaux. Including the latter, 6 vessels of 57,663 tons will be fitted with steam turbines. The total launches include 4 tankers of 28,280 tons.

HOLLAND

The total tonnage launched during 1922 was 163,132 tons. As usual the figures for this country do not include vessels exclusively intended for river navigation.

Twelve vessels of between 4,000 and 8,000 tons each have been launched, and 4 of between 8,000 and 9,200 tons.

The total figures excluding vessels of less than 1,000 tons, comprise 12 vessels of about 79,000 tons, to be fitted with steam turbines, including 10 of between 6,000 and 9,200 tons each.

UNITED STATES

The output for the year 1922 was 119,138 tons, nearly 4,000,000 tons less than the output for the record year of 1919.

The decrease has been general all over the coast; but on the Great Lakes the 1922 launches are nearly 11,000 tons more than for the previous year.

The total figures for the United States, excluding vessels of less than 1,000 tons, comprise 4 vessels of about 33,000 tons to be fitted with steam turbines, including the twin screw steamer *Kamoi* of 10,222 tons, launched at Camden, N.J., for which vessel the turbo-electric method of propulsion has been adopted. Seven steamers of about 49,000 tons were built on the Isherwood system of longitudinal framing.

The totals comprise 5 steamers each of between 6,000 and 10,000 tons, 2 vessels of 10,000 tons and upwards, the largest being one of about 12,000 tons launched at San Francisco.

ITALY

The total figures for this country were 101,177 tons. About 65 per cent of the total represents the output of the Trieste district.

The totals comprise 14 steamers of between 5,500 and 6,700 tons each. Three vessels of 15,193 tons were built to carry oil in bulk.

JAPAN

The output for this country was 83,419 tons.

As compared with pre-war years the present output exceeds the figures for any year prior to 1914. The 1922 totals comprise 6 vessels of between 4,000 and 8,000 tons each, and one turbine-engined vessel of 10,413 tons.

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These figures include 4 vessels of 21,363 tons which will be fitted with steam turbines, and 2 merchant vessels of 12,515 tons built for carrying oil in bulk.

SCANDINAVIAN COUNTRIES

The total tonnage launched in Denmark, Norway, and Sweden amounts to 103,445 tons. As compared with the 1921 output the decrease in Denmark amounts to 36,222 tons, in Sweden to 35,873 tons, and in Norway to 19,067 tons.

The total figures include 2 motor-vessels of between 7,000 and 7,200 tons each launched in Denmark, 3 in Sweden of between 5,000 and 5,630 tons each, and one in Norway of 4,920 tons.

The tonnage of steel vessels fitted with internal combustion engines launched in these countries—56,431—is higher than that of any other country outside Great Britain.

BRITISH DOMINIONS

The total tonnage launched in all the British Dominions overseas during 1922 was 62,765 tons.

The tonnage launched in Canada—17,012 tons—is less than one-quarter of the output of 1921. Only one large vessel is included, viz., a lake steamer of 7,403 tons, built at Port Arthur, Ont.

The tonnage launched in the other British Dominions was 45,753 tons, which includes 25,048 tons launched in the Hong Kong district, and 14,998 tons launched in Australia. The totals for Hong Kong comprise 2 vessels of about 5,800 tons each, and one of 8,030 tons.

SUMMARY

Country	Gross tons
Great Britain and Ireland.....	1,031,081
Germany.....	575,264
France.....	184,509
Holland.....	163,132
United States.....	119,138
Scandinavian Countries (Denmark, Norway, Sweden).....	103,445
Italy.....	101,177
Japan.....	83,419
British Dominions—	
Canada..... 17,012	
Other Dominions..... 45,753	
	62,765

TONNAGE UNDER CONSTRUCTION CLOSE OF 1922

Country	Gross tons
Great Britain and Ireland.....	1,468,599
Germany (excluding Danzig, 47,796 tons).....	416,081
Italy.....	211,499
France.....	188,525
Holland.....	142,969
United States.....	139,448
Japan.....	93,831

TABLE showing Size of Vessels Launched in the World during 1922

Countries where Building	100 to 499 tons			500 to 999 tons			1,000 to 1,999 tons			2,000 to 3,999 tons			4,000 to 5,999 tons		6,000 to 7,999 tons		8,000 to 9,999 tons		10,000, 14,999,	15,000, 19,999,	20,000 and above	Total
	Steam	Motor	Sail	Steam	Motor	Sail	Steam	Motor	Sail	Steam	Motor	Sail	Steam	Motor	Steam	Motor	Steam	Motor	Steam			
Belgium							4				1											4
Brazil																						1
British Dominions	7	2	10	2	2		2			10			2		1		1					39
China	1		1	3			8			1												14
Danzig and Memel	1	1		1			3						2							1		9
Denmark		3	2	2			10			3			1		2							23
France	4	6	12	5	1		3			14			4		8		3		2			62
Germany	36	6	7	15			32	5		35			21	6	8	1	11		3		1	187
Great Britain and Ireland ..	25	3	10	28	2		22	1		24	1		38	2	41	5	13	3	11	5	1	235
Holland	7	4	3	5	1		13	3		8			3		9		4					60
Italy	5	5	13		1					1	3		7		7							42
Japan	18	7		6			3			8			2		4				1			49
Norway	1	3		1			14	3						1								23
Spain										1			1									2
Sweden		1	4				1	2			3			3								14
United States of America ..	8	5	4	6	2	9	4	1	4	3		3			3		2		2			59
Other Countries	2	2	20		3	1	1															29
Total	115	48	86	74	8	14	120	15	4	108	8	3	83	13	81	8	34	3	19	5	3	852

TABLE showing the Steam and Motor Tankers of 1,000 tons and upwards launched in the World during 1922

Countries of Build	No.	Gross tonnage
Great Britain and Ireland	42	262,826
British Dominions	2	11,638
Fiume	1	1,642
France	4	28,280
Germany	1	3,227
Holland	2	2,544
Italy	3	15,193
Japan	2	12,515
Norway	2	3,549
United States of America	2	14,440
	61	355,854

COMPARISON 1921 AND 1922 OUTPUTS OF MERCHANT SHIPS

Comparing the 1921 and 1922 outputs of merchant shipping the total world output for 1921 was 4,341,679 gross tons; for 1922, 2,467,084 gross tons, a decrease of 1,874,595 tons.

The United Kingdom output in 1921 was 1,538,052 tons, in 1922, 1,031,081 tons, a decrease of 506,971 tons.

United States output for 1921 was 1,006,413 tons; in 1922, 119,138 tons, a decrease of 887,275 tons.

Germany's output for 1921 was 509,064 tons; in 1922, 575,264 tons, an increase of 66,200 tons.

Holland's output in 1921 was 232,402 tons; in 1922 163,132 tons, a decrease of 69,270 tons.

Japan's output in 1921 was 227,425 tons; in 1922, 83,419 tons, a decrease of 144,006 tons.

France's output in 1921 was 210,663 tons; in 1922, 184,509 tons, a decrease of 26,154 tons.

The output of the Scandinavian Countries (Denmark, Norway, Sweden) in 1921 was 194,607 tons; in 1922, 103,445 tons, a decrease of 91,162 tons.

Italy's output in 1921 was 164,748 tons; in 1922, 101,177 tons, a decrease of 63,571 tons.

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The output of the British Dominions in 1921 was 129,675 tons; in 1922, 62,765 tons, a decrease of 66,910 tons.

With the single exception of Germany, shipbuilding in every other maritime country shows a decline in 1922, as compared with 1921.

The decline is most marked in the United States and in Japan, but nearly all the other shipbuilding nations including Great Britain show a very considerable falling off in the tonnage output for 1922 as compared with that for 1921.

France is an exception, her 1922 output falling little short of her 1921 output.

GERMAN RECOVERY

A striking feature of world shipbuilding both in 1921, and in 1922, is the remarkable recovery of Germany.

From time to time we are being told of the imminent danger of Germany's economic collapse, which would react injuriously on other countries, including Great Britain. It may be so. But in the case of one important industry at least, involving several subsidiary ones, Germany during the past two years has bettered her pre-war position, which was a strong one.

For some reason or other Germany is able both to build, and to operate ships more cheaply than any other maritime country, and apart from her shipbuilding activities her yards are extensively engaged in repairing and reconditioning work for foreign powers.

In 1921 Germany had moved up to the third place among shipbuilding nations, in 1922 she was easily second, and increasing her output, while other maritime nations were lowering theirs.

GENERAL STATISTICS

In 1922 Britain contributed 41.8 per cent of world tonnage as compared with 35.4 per cent in 1921.

Germany contributed 23.3 per cent of the world tonnage in 1922 and the remaining countries 34.9 per cent.

The United States, Japan, and the British Dominions combined contributed about 9.3 per cent of 1922 world tonnage, which coupled with Great Britain's 41.8 per cent gives 51.1 per cent, the Continental Countries furnishing the remaining 48.9 per cent, which is a record; the Continental percentage in 1921 was 41.

Of the tonnage launched during 1922, 104 vessels of 776,000 tons were fitted with steam turbines, about 35 per cent of the steel steam tonnage launched, giving an average of 7,461 tons per vessel.

The percentage of tonnage fitted with internal combustion engines is increasing; in 1921, 7 per cent of the total tonnage was thus fitted; in 1922, about 9½ per cent.

Of vessels built for the carriage of oil in bulk of over 1,000 tons, 61 in all were launched in 1922, Great Britain and Ireland supplying 42, most of these vessels were built on the Isherwood system of longitudinal framing; the total tonnage and number of vessels built on this system in 1922 was 53, of about 315,000 tons.

Of the 852 ships launched in 1922, 96 are of between 4,000 and 6,000 tons; 126 of between 8,000 and 10,000 tons; and 27 over 10,000 tons.

Of the 27 ships over 10,000 tons, Great Britain and Ireland built 17, Germany 5, France 2, United States 2, and Japan one.

RELATIVE POSITIONS LEADING SHIPBUILDING NATIONS IN 1921 AND 1922

In 1921 the six leading shipbuilding nations were Great Britain and Ireland, United States, Germany, Holland, Japan, and France, in the order named.

In 1922 they were Great Britain and Ireland, Germany, France, Holland, United States, and Italy, in the order named

GROSS TONNAGE of Merchant Vessels LAUNCHED in the World
during each year from 1892 to 1922.



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Lloyds diagram shows that by far the most intensive four year period of world mercantile shipbuilding occurred during the years 1918 to 1921 inclusive, the peak being reached in 1919 when United States contributed a trifle over 4,000,000 tons to the world total of 7,144,549 tons, or about 57 per cent.

NINE-YEAR COMPARISON SHIPBUILDING PRE-WAR AND AFTER

The comparison of world merchant shipbuilding for the 9 years preceding the declaration of the war, and the 9 succeeding years as shown by Lloyd's diagram is of interest.

World output 1905-1913, 22½ million tons; 1914-1922 34 million tons; which partly accounts for the present distressful state of the shipping trade.

CANADIAN GOVERNMENT MERCHANT MARINE

According to the 1923 report of the Canadian Government Merchant Marine Limited, the fleet at present consists of 64 ships with a total deadweight tonnage of 378,237.

On page 13 of the 1920-21 Annual Report of the department, complete details including names of vessels and builders, tonnage, and cost of building of each vessel, were given.

DISPOSITION OF FLEET

The disposition of the company's fleet as at December 31, 1922, was as follows:—

Trade Routes	Number of vessels
United Kingdom and Continent.....	11
Australia.....	10
Asiatic ports.....	5
West Indies and Cuba.....	6
Newfoundland.....	..
Vancouver California.....	3
Coastwise.....	1
Great Lakes Grain Trade (grain storage cargo).....	10
Laid up—Montreal.....	6
Laid up—Halifax.....	3
In port—Halifax.....	3
In port—St. John.....	4
In port—Vancouver.....	2
	<hr/> 64

VOYAGES MADE DURING 1922

During 1922 a total of 235 voyages were made as follows:—

	Number of vessels
<i>Atlantic Services—</i>	
United Kingdom and Continent.....	81
West Indies—Freight.....	29
West Indies—Passenger.....	18
Newfoundland.....	20
Australian.....	12
Mediterranean.....	4
	<hr/> 164
<i>Pacific Services—</i>	
California.....	38
Australian.....	15
Orient.....	16
India.....	2
	<hr/> 71
Total.....	<hr/> 235

TRADE ROUTES

No new services were established in 1922, but ten of the smaller vessels of the fleet, under special charters, were employed in the late autumn in moving grain on the Great Lakes, from lake head to bay ports, where the vessels were laid up for the winter.

In order to assist in relieving the acute fuel situation in Canada in 1922, a number of ships of the Canadian Government Merchant Marine were employed in the transport of coal from British to Canadian ports, 108,139 tons of coal were imported by these ships.

These activities prevented the management from laying up as many ships as was at first intended.

WEST INDIAN PASSENGER SERVICE

The three weeks freight and passenger service with Jamaica, the Bahamas, and British Honduras having proved somewhat unprofitable, a service to Hamilton, Bermuda, was inaugurated; the *Canadian Fisher* and *Canadian Forester* being put on this route with satisfactory results; these ships are not however altogether suitable for this trade, and it is deemed advisable to replace them by oil burning steamers with increased passenger accommodation.

The loss in operation on this account was for 1922, \$255,320.96, and including depreciation on the vessels, \$372,989.83. This loss forms a part of the total deficit shown in the Income Account.

RESULTS OF OPERATION

The accounts for the year ended December 31, 1922, as certified by the Company's Auditors, show the following results:

INCOME ACCOUNT, 1922

Gross revenue from closed voyages.....	\$ 9,705,786 97
Operating expenses, closed voyages.....	12,039,976 14
	<hr/>
Deficit from operation.....	\$ 2,384,189 17
Add:—	
Interest accrued on notes to Government.....	\$4,078,277 74
Reserve for depreciation.....	2,932,130 14
Reserve for outstanding liabilities.....	40,000 00
Reserve for doubtful debts and claims.....	96,122 00
Interest on Government advances.....	118,759 67
	<hr/>
	7,265,289 55
Deficit after all charges, including depreciation and interest	<hr/> \$ 9,649,478 72

Canada in common with all other maritime countries has been seriously affected by the present stagnation of the shipping trade, due to causes outlined in this and previous reports, the chief one being overbuilding during the years 1918 to 1921, as shown by Lloyd's diagram given in a previous part of this report.

Lloyd's however is of the opinion that the worst period of this stagnation has been passed, and that the shipping situation is likely to be gradually relieved.

As an offset to the losses incurred by the Canadian Government Merchant Marine in 1922 the report points out that for the eleven months ending in November, 1922, shipments amounting to 172,577 tons were turned over to the Canadian National Railways, and 36,949 tons of import trade were handled over the Government dock at Vancouver from December 1, 1921, to November 1, 1922.

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The revenue accruing to the railways from passengers carried by the Canadian Government Merchant Marine during the same period amounted to \$34,101.21.

It will thus be seen that the Canadian Government Merchant Marine serves the purpose of bringing grist to the mill of the National Railways.

It also serves the purpose of keeping open trade routes, which if properly utilized, may eventually show profits.

The report finally recommends that a total complement of 37 vessels be kept in operation, and the balance disposed of.

AMERICAN MERCHANT MARINE

The returns here given are taken from the annual report of the Commissioner of Navigation for the Secretary of Commerce for the American fiscal year ended June 30, 1922.

COMPARISON of American Merchant Fleet of 1921 and 1922.

	Total Merchant Fleet			
	1921		1922	
	Number	Gross tons	Number	Gross tons
<i>Geographical Distribution—</i>				
Atlantic and Gulf coasts.....	16,972	11,852,435	16,608	12,130,683
Pacific coast.....	6,409	3,467,872	6,298	3,473,581
Northern lakes.....	2,942	2,839,514	2,745	2,723,857
Western rivers.....	1,689	122,315	1,707	134,847
Total.....	28,012	18,282,136	27,358	18,462,968
<i>Power and Material—</i>				
Sail—				
Wood.....	3,522	1,002,449	3,159	974,123
Metal.....	151	291,844	157	313,491
Total.....	3,673	1,294,293	3,316	1,287,614
Steam—				
Wood.....	4,185	1,509,500	4,000	1,402,699
Metal.....	4,136	13,861,400	4,177	14,204,027
Total.....	8,321	15,370,900	8,177	15,606,726
Gas—				
Wood.....	10,576	283,900	10,595	274,037
Metal.....	174	90,315	188	101,338
Total.....	10,750	374,215	10,783	375,375
Canal—				
Wood.....	442	51,559	412	47,616
Barges—				
Wood.....	4,458	1,008,819	4,299	959,220
Metal.....	368	182,350	371	186,417
Total.....	4,826	1,191,169	4,670	1,145,637
Grand total.....	28,012	18,282,136	27,358	18,462,968

VESSELS built during fiscal years 1921 and 1922

	1921		1922	
	Number	Gross tons	Number	Gross tons
<i>Geographical Distribution—</i>				
Atlantic and Gulf coasts.....	819	1,533,930	503	505,170
Pacific coast.....	281	613,625	154	132,538
Northern lakes.....	130	106,731	63	8,102
Western rivers.....	131	10,829	125	15,422
Total.....	1,361	2,265,115	845	661,232
<i>Power and Material—</i>				
Sail—				
Wood.....	69	90,554	45	25,459
Metal ..	1	1,189		
Total.....	70	91,743	45	25,459
Steam—				
Wood.....	76	29,426	39	5,742
Metal ..	1375	2,000,994	292	562,175
Total.....	451	2,030,420	131	567,917
Gas—				
Wood.....	491	12,810	3495	12,921
Metal.....	422	27,991	522	16,299
Total.....	513	40,801	517	29,220
Canal—				
Wood.....	23	3,278	13	1,045
Barges—				
Wood.....	231	69,668	115	27,773
Metal ..	673	29,205	724	9,818
Total.....	304	98,873	139	37,591
Total construction.....	1,361	2,265,115	845	661,232

¹ Includes 6 concrete steam vessels of 37,553 gross tons.
² Includes 1 iron steam vessel of 289 gross tons.
³ Includes 1 electric yacht of 195 gross tons.
⁴ Includes 1 concrete gas vessel of 1,433 gross tons.
⁵ Includes 1 electric steel yacht of 508 gross tons and 1 composite gas vessel of 16 gross tons.
⁶ Includes 10 concrete barges of 2,709 gross tons.
⁷ Includes 1 concrete barge of 608 gross tons.

CURRENT AMERICAN SHIPBUILDING

On July 1, 1922, American shipyards were building or under contract to build for private owners 105 steel vessels of 204,544 gross tons.

There was a considerable revival of shipbuilding on the Great Lakes, approximately 50,000 tons being under construction or contracted for.

The present outlook is for further construction for the Great Lakes excursion trade.

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NATIONALITY OF CREWS, 1921-22

The following table shows the nationality of the officers (excluding masters) and men shipped and reshipped before shipping commissioners during 1921 and 1922.

Nationality	1921	1922
Americans (born).....	125,067	85,989
Americans (naturalized).....	32,356	26,284
British.....	38,061	27,551
Chinese.....	3,496	3,756
Japanese.....	1,129	467
Filipinos.....	2,825	3,395
Germans.....	1,626	8,098
Norwegians.....	10,138	7,227
Swedes.....	9,574	6,550
Danes.....	5,456	4,000
Russians.....	8,811	4,483
Austrians.....	684	828
French.....	1,040	703
Spanish.....	31,350	22,787
Italians.....	4,871	2,754
Portuguese.....	5,784	4,884
Others.....	43,564	25,792
Unknown.....		
Total.....	325,832	235,548
Per cent Americans.....	48.3	47.6

An interesting feature of this table is the marked increase of Germans in the 1922 American Merchant Marine, 8,098 as against 1,626 in 1921, and this despite the fact that the strength in officers and men of the 1922 American Merchant Marine is 90,284 less than the 1921 one.

VALUE of American Foreign Trade carried by American and Foreign Ships in
1921 and 1922

Year	Imports		Exports		Total American	Total Foreign
	In American vessels	In Foreign vessels	In American vessels	In Foreign vessels		
	\$	\$	\$	\$	\$	\$
1921.....	1,301,944,050	1,905,762,619	2,245,703,389	3,457,024,652	3,547,647,439	5,362,787,271
1922.....	734,375,471	1,533,906,433	1,177,147,354	2,067,980,206	1,911,522,825	3,601,886,639

OPERATIONS OF CHIEF CANADIAN SHIPBUILDING PLANTS

WALLACE SHIPBUILDING AND DRYDOCK COMPANY, LIMITED, NORTH VANCOUVER, B.C.

Reconditioning.—ss. *Imperial*.

Repairs were effected on 61 steamships, 2 barges, and 26 tugs, while 25 vessels were lined for grain.

DAVIE SHIPBUILDING AND REPAIRING COMPANY, LIMITED, LAUZON, P.Q.

The number of vessels repaired or overhauled was 25.

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PORT ARTHUR SHIPBUILDING COMPANY, LIMITED, PORT ARTHUR, ONT.

Repair Work—

Total number of boats entering plant for repairs.. .. .	123
Number of hull repairs jobs involved.. .. .	65
Number of engine repairs jobs involved.. .. .	51
Number of boiler repairs jobs involved.. .. .	26
Number of miscellaneous jobs involved.. .. .	9
	151

Dry Dock Report—

No. of boats docked, tonnage basis...	12....Gross tonnage...	38,113
No. of tugs docked.. .. .	3	
Total.. .. .	15	

New Construction.—Steamer *Mathewston*, deadweight tonnage 10,000 delivered October 8, 1922.

HALIFAX SHIPYARDS, LIMITED, HALIFAX, N.S.

No new construction was carried out.

Repair work to the amount of \$642,352.31 was executed.

CANADIAN VICKERS, LIMITED, MONTREAL, P.Q.

New Construction.—Hopper barge for Canadian Government, 210 feet by 35 feet by 19 feet, steel built, steam driven, single screw, gross tonnage approximately 1,000.

Repair work was done on 64 vessels.

MIDLAND SHIPBUILDING COMPANY, LIMITED, MIDLAND, ONT.

New Construction.—Building canal size coal carrying self-unloader, proposed name *Glenelg*, ready for service June 1, 1923.

Converting barge *George E. Hartnell* into regular type Great Lakes (Upper Lakes) bulk freighter by the installation of engines, two boilers and all necessary accommodation and equipment—proposed name *Glenogle*—ready for service opening navigation 1923.

Installation of two new boilers, etc., ss. *Glengarnock*.

Repairs.—Repairs and alterations of varying dimensions to the following vessels: *Glenfinnan*, *Glencaly*, *Glenarm*, *Glendowan*, *Glenlivet*, *Glenlyon*, *Midland Prince*, etc., etc.

YARROWS, LIMITED, VICTORIA, B.C.

Construction.—A motor car ferry for the Canadian Pacific Railway, for service between Bellingham, Washington, and Sidney, Vancouver Island.

Repairs.—Repairs effected on approximately 251,659 gross tons of shipping.

STATEMENT of Vessels Built in Canada and Registered during 1922.

Province	Wood						Metal						Totals		
	Sailing			Steam			Sailing			Steam			Totals		
	Tonnage			Tonnage			Tonnage			Tonnage			Tonnage		
	No.	Gross	Net	No.	Gross	Net	No.	Gross	Net	No.	Gross	Net	No.	Gross	Net
Nova Scotia.....	10	1,460	1,157	5	512	272	11	304	275				26	2,276	1,704
New Brunswick.....	2	33	33	2	30	26	14	149	133				18	212	192
Prince Edward Island.....															
Quebec.....	29	1,618	1,595	7	210	70	27	259	127				67	10,222	6,647
Ontario.....	4	526	471	11	555	275	7	109	64	4	8,135	4,855	24	10,608	7,379
Manitoba.....	9	1,119	1,119	1	866	546	1	49	33	2	9,418	6,569	11	2,034	1,608
Saskatchewan.....				1	54	39							1	54	39
British Columbia.....	28	5,082	5,082	5	532	158	56	962	577	1	4,032	2,449	90	10,608	8,266
Yukon Territory.....															
Totals.....	82	9,838	9,457	32	2,759	1,386	116	1,832	1,209	7	21,585	13,873	237	36,014	25,925

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STATEMENT Showing the Number of Vessels and Number of Tons on the Registry Books of the Dominion on December 31, 1922

Ports	Sailing Vessels			Steam Vessels		
	No.	Gross tons	Net tons	No.	Gross tons	Net tons
<i>New Brunswick—</i>						
Campbellton.....				1	68	13
Chatham.....	288	7,882	7,608	126	4,159	2,666
Dorchester.....	2	277	262	2	8	6
Moncton.....	2	28	26			
Richibucto.....	20	363	353	14	257	191
Sackville.....	1	12	12	1	16	11
St. Andrews.....	110	1,930	1,872	41	890	633
St. John.....	160	17,723	16,702	98	12,771	8,752
	583	27,815	26,835	283	18,169	12,272
<i>Nova Scotia—</i>						
Amherst.....	2	97	80	3	191	120
Annapolis Royal.....	11	2,746	2,433	8	677	423
Arichat.....	64	1,677	1,620	31	524	487
Barrington Passage.....	32	764	734	38	780	687
Canso.....	33	936	883	8	159	151
Digby.....	57	2,564	2,448	19	1,188	873
Guysboro.....	3	308	279			
Halifax.....	128	8,952	8,573	146	56,370	34,661
La Have.....	37	8,512	6,907	5	430	323
Liverpool.....	20	2,212	1,978	22	11,108	656
Lunenburg.....	192	24,725	19,471	151	4,064	3,154
Maitland.....	5	723	646	1	88	59
Parrsboro.....	54	16,494	15,160	15	1,181	839
Pictou.....	12	2,659	2,453	12	2,229	1,389
Port Hawkesbury.....	24	373	373	8	208	173
Port Medway.....	4	226	226	4	60	56
Shelburne.....	32	1,274	1,265	19	800	608
Sydney.....	57	3,975	3,777	42	3,007	1,524
Truro.....				1	18	7
Weymouth.....	21	6,892	6,118	15	812	582
Windsor.....	29	15,082	13,870	17	4,300	2,616
Yarmouth.....	84	2,854	2,714	57	9,843	4,933
	901	104,045	92,008	622	88,037	54,321
<i>Ontario—</i>						
Amherstburg.....	4	602	602	8	895	471
Belleville.....	2	72	72	10	232	138
Bowmanville.....	1	146	146			
Brockville.....	1	819	751	14	530	339
Chatham.....	4	566	556	7	333	224
Cobourg.....						
Collingwood.....	4	1,119	1,119	46	15,597	10,479
Cornwall.....				4	123	75
Deseronto.....	5	403	370	3	31	22
Dunnville.....	1	87	57			
Fort William.....	1	413	413	3	628	344
Goderich.....	4	675	675	27	1,450	962
Hamilton.....	3	807	780	21	9,188	5,701
Kenora.....	6	535	535	89	3,467	2,195
Kingston.....	47	7,796	6,910	102	9,032	5,298
Lindsay.....				12	397	271
Midland.....	7	3,681	3,166	54	62,784	41,470
Napanee.....	1	122	122			
Oakville.....	1	26	26			
Ottawa.....	108	17,321	16,332	205	42,390	21,883
Owen Sound.....	5	2,317	2,063	31	3,249	2,157
Peterborough.....	21	1,622	1,622	46	969	661
Pictou.....	5	2,066	1,885	9	3,962	2,787
Port Arthur.....	65	19,984	19,613	72	23,535	14,064
Port Burwell.....	1	65	65	9	295	152
Port Dover.....	1	68	68	12	395	247
Port Hope.....						
Port Stanley.....				24	989	634
Prescott.....	8	1,323	1,195	12	2,262	1,528
Sarnia.....	9	2,189	1,978	38	32,000	19,838

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STATEMENT Showing the Number of Vessels and Number of Tons on the Registry Books of the Dominion on December 31, 1922—*Concluded*

Ports	Sailing Vessels			Steam Vessels		
	No.	Gross tons	Net tons	No.	Gross tons	Net tons
<i>Ontario—Con.</i>						
St. Catharines.....	21	5,937	5,356	44	1,622	1,015
Sault Ste. Marie.....	38	7,636	7,355	48	18,711	11,622
Simcoe.....	2	36	36	2	35	18
Southampton.....				9	305	207
Toronto.....	63	14,917	12,978	257	121,972	78,358
Wallaceburg.....	2	490	475	9	381	264
Whitby.....						
Windsor.....	11	2,202	2,096	14	6,121	3,683
	452	96,042	89,417	1,241	363,880	227,107
<i>Quebec—</i>						
Gaspe.....	11	475	435	4	284	202
Magdalen Islands.....	9	441	432	1	135	92
Montreal.....	279	92,709	88,815	441	499,708	304,425
Paspébiac.....	11	243	233	10	320	227
Quebec.....	318	33,854	32,718	163	30,021	17,301
Sorel.....	25	9,949	8,910	42	11,545	5,417
	653	137,671	131,543	661	542,013	327,664
<i>British Columbia—</i>						
New Westminster.....	99	15,728	15,668	252	9,947	5,619
Prince Rupert.....	4	1,227	1,227	95	15,551	9,319
Vancouver.....	322	54,848	54,296	873	178,961	108,904
Victoria.....	110	25,978	24,912	251	65,237	39,138
	535	97,781	96,123	1,471	269,696	162,980
Charlottetown, P.E.I.....	106	6,752	6,353	32	7,048	3,262
Prince Albert, Sask.....	1	145	145	5	588	341
Winnipeg, Man.....	22	4,655	4,655	69	8,801	5,685
Dawson, Y.T.....				4	1,204	813
Grand total.....	3,253	474,906	447,079	4,388	1,299,436	789,147

RECAPITULATION

Province	Sailing Vessels			Steam Vessels		
	No.	Gross tons	Net tons	No.	Gross tons	Net tons
New Brunswick.....	583	27,815	26,835	283	18,169	12,272
Nova Scotia.....	901	104,045	92,008	622	88,037	54,321
Ontario.....	452	96,042	89,417	1,241	363,880	227,107
Quebec.....	653	137,671	131,543	661	542,013	327,664
British Columbia.....	535	97,781	96,123	1,471	269,696	162,980
Prince Edward Island.....	106	6,752	6,353	32	7,048	3,262
Saskatchewan.....	1	145	145	5	588	341
Manitoba.....	22	4,655	4,655	69	8,801	5,685
Yukon Territory.....				4	1,204	813
	3,253	474,906	447,079	4,388	1,299,436	789,147

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STATEMENT showing the number of vessels removed from the Registry
Books of the Dominion, during the year ended December, 31, 1922

Sold to foreigners.....	25
Wrecked.....	17
Stranded.....	6
Lost.....	11
Broken up.....	62
Abandoned at sea.....	4
Collisions.....	3
Foundered.....	11
Burnt.....	9
Registry no longer required.....	3
Transferred to St. John's, Newfoundland.....	7
Transferred to Great Britain.....	2
Transferred to British West Indies.....	3
Transferred to Hong Kong.....	1
	<hr/>
	164

It is estimated that 43,164 men and boys, etc., inclusive of Masters were employed on the ships registered in Canada during the year 1922.

COMPARATIVE STATEMENT showing the Number of Vessels and Number of Net Tons on the Registry Books of the Dominion of Canada, on December 31, in each Year from 1913 to 1922, both inclusive.

Province	1913		1914		1915		1916		1917	
	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons
New Brunswick.....	1,031	60,020	1,052	55,522	1,068	56,219	1,074	49,817	1,074	49,883
Nova Scotia.....	2,106	138,107	2,098	135,053	2,087	125,567	2,064	123,058	2,010	119,805
Quebec.....	1,628	247,225	1,663	259,143	1,590	267,897	1,452	273,770	1,391	283,942
Ontario.....	2,012	279,642	2,100	314,660	2,111	312,971	2,116	328,531	2,079	311,283
Prince Edward Island.....	149	10,071	149	10,029	158	11,518	155	10,652	157	10,955
British Columbia.....	1,506	15,306	1,591	147,192	1,643	144,835	1,687	145,525	1,734	183,002
Manitoba.....	93	5,545	103	7,999	84	7,480	95	8,953	5	530
Yukon District.....	15	2,940	11	2,295	11	2,295	11	2,295	99	9,834
Saskatchewan.....	5	356	5	529	5	530	5	530	10	2,204
	8,545	896,965	8,772	932,422	8,757	929,312	8,659	943,131	8,559	971,438
Province	1918		1919		1920		1921		1922	
New Brunswick.....	1,043	49,483	1,018	42,050	917	38,634	859	40,456	866	39,107
Nova Scotia.....	1,948	124,517	1,965	158,100	1,709	152,130	1,550	153,461	1,523	146,329
Quebec.....	1,318	175,235	1,340	342,424	1,321	409,442	1,252	449,817	1,693	516,524
Ontario.....	2,064	312,865	1,986	320,065	1,793	313,875	1,681	306,944	1,314	459,207
Prince Edward Island.....	158	10,805	158	10,726	143	9,993	137	9,560	2,006	259,103
British Columbia.....	1,928	231,513	2,006	207,708	1,930	217,481	1,908	252,876	138	9,615
Manitoba.....	96	9,791	89	9,160	83	9,119	86	9,599	6	486
Yukon District.....	8	2,040	6	1,133	4	813	4	813	91	10,340
Saskatchewan.....	5	529	5	529	4	393	5	447	4	813
	8,568	1,016,778	8,573	1,091,895	7,904	1,151,880	7,482	1,223,973	7,641	1,241,524

COMPARATIVE STATEMENT of Vessels Built and Registered in the Dominion of Canada and their Net Tonnage during the Year ended December 31, in each Year from 1913 to 1922, both inclusive.

Province	1913		1914		1915		1916		1917	
	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons
New Brunswick.....	45	1,114	31	1,319	22	1,114	22	332	23	1,156
Nova Scotia.....	67	4,899	56	3,303	51	2,982	65	7,661	86	14,781
Quebec.....	62	8,667	51	6,753	49	7,790	51	8,613	32	8,058
Ontario.....	38	15,572	78	23,567	38	4,709	26	5,507	21	3,919
Prince Edward Island.....	3	804	2	35	2	24	.....	.....	.....	.....
British Columbia.....	128	9,000	97	5,867	79	2,057	65	4,487	77	17,452
Manitoba.....	1	18	11	2,899	5	156	15	1,573	4	881
Yukon District.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Saskatchewan.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	344	40,164	327	43,246	246	18,832	241	28,303	243	46,277
Province	1918		1919		1920		1921		1922	
New Brunswick.....	16	2,590	14	3,326	5	103	5	517	18	192
Nova Scotia.....	110	27,831	163	43,877	87	15,440	38	12,357	26	1,701
Quebec.....	26	9,086	46	45,831	82	48,303	41	30,800	24	7,379
Ontario.....	48	10,098	37	10,858	14	3,004	17	2,386	67	6,617
Prince Edward Island.....	4	78	5	507	4	270	.....	.....	90	8,266
British Columbia.....	192	54,889	138	23,396	136	35,512	72	22,939	.....	.....
Manitoba.....	1	39	4	143	.....	.....	7	572	1	39
Yukon District.....	.....	.....	.....	.....	.....	.....	.....	.....	11	1,698
Saskatchewan.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	397	104,611	407	127,938	329	102,779	181	69,655	237	25,925

SESSIONAL PAPER No. 28

REPORT OF B. H. FRASER, M.E.I.C., CHIEF ENGINEER

OFFICE WORK

Total plans for twelve months	1,723
Charts received and recorded	114
Photographs received and recorded	147
Specifications and bills of materials written.. .. .	80

PUBLICATIONS

Eighty notices to Mariners were issued covering 210 subjects.

The following may be especially noted:—

Sailing directions for Quatsino Sound, B.C.

Information regarding weather, ice and other reports transmitted by radio-telegraph.

General notice regarding danger of cargo shifting.

Regulations for Pilotage in the St. Lawrence river.

General notice of Diseases of Animals Acts, 1894 to 1914.

Notice regarding changes in Quarantine regulations in the St. Lawrence river, below Quebec.

Regulations for the protection of Aids to Navigation.

Changes in traffic signals at Prospect Point, B.C.

Description of improvements to navigable channels by dredging done by the Department of Public Works.

Notices relating to waters outside Canada.

The annual edition of the "List of Lights and Fog Signals", in three sections, was issued.

ICE-BREAKING

The contract with the Great Lakes Transportation Company, to keep the harbours at the head of Lake Superior open for navigation until December 17, in each year, and to open them in the spring, as soon as the canal at Sault Ste. Marie is open for navigation, is still in force.

REMOVAL OF OBSTRUCTIONS TO NAVIGATION

East River, P.E.I.	A spar and some smelt poles which were a menace to navigation were removed.
Gaspereau River, P.E.I.	Cribwork removed under contract by Michael O'Connell.
Little Caribou harbour, P.E.I.	Derelict of schooner <i>Union</i> removed by the Department under the direction of the customs officer.
Richibucto harbour	The hulk of an old wreck was removed under contract by H. C. Bray.
Strait of Canso, N.S.	Trawler <i>Baleine</i> which was wrecked at the south entrance of strait of Canso was removed by the departmental diver.
Lennox Passage, N.S.	Schooner <i>Iona</i> which struck the bridge and sunk in channel was removed by the captain of barge <i>Liberty</i> under contract.
East Cove, N.B.	The <i>Abbie Keast</i> which was wrecked on the beach at East Cove was removed by departmental diver.
Chance harbour, N.B.	Wreck of schooner <i>Senator</i> removed by departmental diver.
Basin of Mines, N.B.... .. .	The schooner <i>Charlotte Comeau</i> which was burnt and wrecked off Horton bluff lighthouse was removed by the owners.
St. John river, N.B.	Steamer <i>Dream</i> which sunk in St. John river one mile from Palmer Point lighthouse was removed by the owners.
Two Rivers, N.B.	Schooner <i>Effie</i> which was wrecked near wharf at Two Rivers was removed by departmental diver.

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St. John harbour	The quarantine launch <i>Eleanor</i> which collided with tug Herald and subsequently sunk in the harbour was raised and placed in slip for the Department of Health under contract by Mr. F. Doyle.
Wolf Point, N.B.	Schooner <i>Flora</i> which sank in the basin at Wolf Point was removed by departmental diver.
Spencer island, N.S.	The wrecked schooner <i>L. T. Whitmore</i> was removed by departmental diver.
Wolf Point, N.B.	Schooner <i>Margaret</i> which sank at Wolf Point was removed by departmental diver.
Weymouth, N.S.	Two old abutments which were a menace to navigation were removed by L. Leblanc under contract.
Port Daniel, P.Q.	Steamer <i>Brumath</i> caught fire near Port Daniel and sank. The obstruction was removed by the Bathurst Company.
Matane, P.Q.	The hull of <i>Marie Vigilante</i> which was a menace to navigation was destroyed by burning.
Magog, P.Q.	The paddle wheel from <i>Lady of the Lake</i> which was causing an obstruction was removed by the owners.
Beauharnois, P.Q.	The wreck of the tug <i>St. Louis</i> was removed by day labour.
Sorel, P.Q.	Dump scows which were sunk in the basin were removed by the owners.
Collins Bay, Ont.	Wrecks of schooners <i>Philo Bennett</i> , <i>Annie Craig</i> and tug <i>McArthur</i> were removed under contract by The Donnelly Salvage and Wrecking Company.
Little Current, Ont.	Steamer <i>Edna Ivan</i> burnt at Little Current was removed by Midland Transportation Company.
Main Ducks, Ont.	The spar of the wrecked schooner <i>Oliver Mowatt</i> which was causing a menace to navigation was removed by the department.
Alberni harbour, B.C.	Removal of several sunken logs.

MAINTENANCE AND REPAIRS TO WHARVES

Repairs to wharves were attended to by this branch at the following places:—

<i>Nova Scotia</i> —	Lorneville,	Berthier en bas,
Port Clyde,	North head, Grand Manan,	Cap au Corbeau,
Cape St. Mary,	St. George,	Carleton,
Carrs Brook,	Caraquet,	Chicoutimi,
Church point,	Whites Bluff.	Ile aux Coudres,
Clarks harbour,	<i>British Columbia</i> —	Les Eboulements,
Halls harbour,	Celesta,	Montmagny,
Westport.	Powell river,	Paspebiac,
<i>Ontario</i> —	Sidney,	Quebec,
Fitzroy harbour,	Prince Rupert.	Rivière Ouelle,
Lansdowne,	<i>Prince Edward Island</i> —	Roberval,
Port Rowan,	Kier Shore,	St. Irenée,
Rosseau.	Mount Stewart,	Three Lakes,
<i>New Brunswick</i> —	Pictou,	Hudson,
Earles,	Tignish.	Thurso.
Hampstead,	<i>Quebec</i> —	
Harbourville,	Anse St. Jean,	

NOVA SCOTIA

NEW AIDS TO NAVIGATION

Dartmouth	Remodelling of trawler <i>Vimy</i> to be used as a lightship.
Guion island	Erection of a fog alarm building and installation of a diaphone, oil engines, air compressors, etc., as well as the erection of a bridge.

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CHANGES AND IMPROVEMENTS IN EXISTING AIDS

Beaver Island	Installation of a triple flash catoptric light and 35 m/m burner.
Cape Race, Nfld.	Installation of two 50 horse-power Robb Mumford boilers.
Chebucto head	Installation of an oil tank.
Flat point	Repairs to breastwork.
Flint island	Installation of an oil storage tank.
Little Hope	Repairs to protection work.
Pearl island	Larger hand fog horn supplied.
Port Mouton	Erection of dwelling to replace one destroyed by fire.
Salvages	Repairs to wharf and re-sheathing of fog alarm building.

NEW BRUNSWICK AGENCY

NEW AIDS TO NAVIGATION

Abbot harbour	The disused tower from Amherst was moved to east side of Abbott harbour, which shows a fixed white light, using a 6th order lens.
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CHANGES AND IMPROVEMENTS TO EXISTING AIDS

Amherst point	Back light tower moved to a new location.
Cape d'Or	Tower moved from Eatonville to new site at Cape d'Or.
Cape Fourchu	Construction of bridge leading to fog alarm building.
Harbourville	Lighthouse built to replace one destroyed by storm; white square wooden tower, 6th order lens, fixed white light.
Long Eddy point	Oil storage tank installed.
Lurcher lightship	Installation of 24" reflector and duplex burner.
Machias Seal island	Cooling tank 8' 0" x 3' 6".
Mitchener point	Installation of 24" reflector and duplex burner.
Old Proprietor buoy	30 fathoms 1 $\frac{1}{4}$ " chain supplied.
Parrsboro	Installation of type "A" diaphone.
Point Prim	Oil storage tank 10' x 4' 6" supplied.
Yarmouth buoy	45 fathoms 1 $\frac{1}{2}$ " chain and 30 fathoms 1 $\frac{1}{4}$ " chain.
St. John Agency	Repairs to sheds. 50 spar buoys complete with irons.

PRINCE EDWARD ISLAND AGENCY

CHANGES AND IMPROVEMENTS IN EXISTING AIDS

Belle Isle, N.E.	Repairs to tower, tanks and fog alarm building.
Belle Isle, S.	Repairs to wharf, new hoist, etc.
Belle Isle	Telephone communication between N.E. and S.W. light stations completed.
Bird rocks	Repairs to landing.
Cape Anguille	Repairs to coal shed floor.
Cape Bauld, Nfld.	Repairs to dwelling, painting, installation of tanks, etc.
Cape Norman	Construction of concrete wharf, derrick and repairs to tower.
Charlottetown Agency	Construction of 16 wooden spars for buoys. Installation of electric motor, drill press, etc. Repairs to wharf.
Entry island	Construction of fog alarm building, dwelling. Provision and installation of engines, compressors, air tanks, etc. (Work not quite finished.)
Escuminac	Repairs to protection work and construction of small dam.
Etang du Nord	Hand fog horn.
Flat island	Repairs to dwelling.
Greenly island	Improvements and extension to dwelling, repairs to fog alarm building, painting of tanks, repairs to barn, etc.
North Tracadie	Location of range lights changed.
Pictou bar	Repairs to protection work.
Portage island	Front light moved to new location.
Richibucto	Range lights moved to suit channel.
St. Mary island	Provision and installation of revolving pedestal with mercury float.
Summerside	Light moved to a new location.
Trenton	Erection of sheds.

QUEBEC AGENCY

NEW AIDS TO NAVIGATION

Anticosti lightship	Provision and installation of a wireless equipment.
Miscou harbour	Harper point light moved to a new site and placed on concrete foundation, erection of a pole light with headlight lantern, and shed at base, both to form a range.
Red Islet lightship	Trawler <i>Messines</i> converted into a lightship and fitted with all appurtenances required for maintaining lights and fog signals.
Rivière du Moulin	Erection of mast with shed and instalation of traction headlight lantern.
St. Maurice de l'Echourie ..	Erection of mast with shed at base, with lens lantern.

CHANGES AND IMPROVEMENTS TO EXISTING AIDS

Anse St. Jean	Light improved.
Bathurst	Reshingling roof of shelter house and other repairs.
Cap des Rosiers	Repairs to lantern.
Cape Dogs	Repairs to roof of fog alarm and new boom provided for derrick.
Charleton point, Anticosti ..	Repairs to cistern, drain and foundation.
Ile au Marteau	Installation of two tanks.
Little Métis	Repairs to tower and fog alarm building.
Papinachois	Headlight lantern to replace one destroyed by fire.
Peribonka, inner range	Erection of two sheds and repairs to beacons.
Perroquet island	Installation of two tanks.
Quebec	Construction of wharf between Borlands wharf and Henrys wharf (to be completed next year). Repairs and changes in heating system. Provision of four steel ice buoys.
Stonehaven	Erection of mast light at end of wharf.
West point, Anticosti	Repairs to residence.

MONTREAL DISTRICT

NEW AIDS TO NAVIGATION

Montreal	Purchase of 20 steel ice buoys.
	" 6 swift current can buoys.
	" 6 swift current conical buoys.

CHANGES AND IMPROVEMENTS TO EXISTING AIDS

Cascades	Purchase of site for front light.
Contrecoeur	Light moved to new location.
Dorval	Installation of new burner.
Ile Bouchard	Instalation of 24-inch reflector in back range light.
Nicolet river	Position of range lights changed.

ONTARIO (INCLUDING NORTHWEST TERRITORIES)

NEW AIDS TO NAVIGATION

Castor island	Establishment of a pole light.
Great Slave Lake, N.W.T. ..	Establishment of buoys and beacons in Great Slave lake and adjoining waters.
Opeeche island	Establishment of a pole light.
Soulanges canal	Establishment of an unwatched Aga light on breakwater.

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CHANGES AND IMPROVEMENTS TO EXISTING AIDS

Amherstburg	Repairs to scow <i>Prescott</i> .
Barriefield Common	Repairs to lighthouse foundation piers.
Buckham point	Temporary pole light.
Burlington	Installation of electric lights and electrically driven fog alarm.
Bushby point	Provision of 2 Traction headlights.
Cherry island	Installation of a triple mantle burner.
Colchester reef	Repairs to pier.
Great Duck island	Steam plant replaced by an oil plant using 10 horse-power internal combustion engines, and type "F" diaphone.
Lancaster bar	Installation of a 6th order lens.
Muskoka river	Building and placing three tripods.
Niagara on the Lake	Provision of 4 50-gallon oil tanks.
North Bay	Provision of 5th order lens and accessories.
Oakville	Repairs to tower.
Ottawa	Purchase of 18 4-foot can buoys.
	" 18 5-ft. 6-in. conical buoys.
	" 39 buoy floats.
Point Peter	Construction of dwelling to replace one destroyed by fire.
Port Colborne	Electric light installed.
Prescott Depot	Installation of engine, construction of derrick house, etc., on scow <i>Amherstburg</i> .
	Construction of three superstructures for gas and bell buoy.
	Fitting out the <i>Marafiscan</i> .
	Change made to fence at Depot.
	Construction of 24 hardwood rollers.
	Construction of 39 buoy superstructures.
	Construction of 2 buoy superstructures for gas and whistling buoys.
	Construction of 2 buoy superstructures for gas and bell buoys.
Sault Ste. Marie	Purchase of 6 life buoys for wharf.
Shaganash	Erection of temporary light and shed replacing lighthouse destroyed by fire.
Toronto, West Gap	Range lights electrified.
Trenton	Pole with light replaced.
Windmill point	Light improved by the installation of triple mantle burner.

BRITISH COLUMBIA (VICTORIA AGENCY)

NEW AIDS TO NAVIGATION

Amos island	Day beacon.
Caraholly	Erection of concrete beacon carrying slatwork drum.
Half tide rock	Erection of beacon.
Richard rock	Erection of beacon.
Victoria	12 cedar spar buoys with mooring irons.

CHANGES AND IMPROVEMENTS TO EXISTING AIDS

Brockton point	Erection of wire fence.
Burnaby shoal	Repairs to beacon by driving piles and repairs to cable.
Cape Beale	Repairs to wooden trestle.
Carmanah	Completion of concrete tower started last year.
Fraser river	26 spar buoys.
	Repairs to foundation inner light, North Arm.
	Re-arrangement of beacons.

BRITISH COLUMBIA (PRINCE RUPERT AGENCY)

NEW AIDS TO NAVIGATION

Kingui island	Establishment of an Aga beacon.
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CHANGES AND IMPROVEMENTS IN EXISTING AIDS

Green island	Railing on lighthouse tower renewed.
Lawyer island	Boathouse resingled, repairs to slipway, sidewalk and derrick.
	Construction of fog alarm building under contract by E. H. Shockley.
	Installation of engines, compressors, diaphone, etc.
Prince Rupert	Repairs to departmental wharf.
	12 cedar spar buoys with mooring irons.
Triple island	Lantern re-glazed, storm windows installed, etc.

COMMISSIONER OF LIGHTS' BRANCH

REPORT OF J. G. McPHAIL, B.A., B.Sc., M.E.I.C., COMMISSIONER OF LIGHTS

The principal work performed during the year has been an extension of the buoy and beacon service, together with the maintenance of lights and other aids to navigation throughout the Dominion, and the maintenance and inspection of public wharves. The operations of this branch are set forth in tabular form in two inclosures.

INCLOSURE No. 1.—Statement, by districts, showing the number of lights of the several orders, lightships, lightkeepers, fog signals, buoys, submarine bells, etc.

	1st order lights	2nd order lights	3rd order lights	4th order lights	5th order lights	6th order lights	7th order lights	Gas beacons	Pressed lens lights and other minor types	Catoptric lights	Electric lights	Total	Lightships	Lightkeepers	Diaphanes	Fog guns and bombs
New Brunswick...				23	21	27	56	3	3	11	6	157	1	154	25	1
Nova Scotia...	3	3	8	32	15	18	39	3	13	45	5	184	1	169	15	1
Prince Edward Island...	2	7	9	33	6	10	42	5	11	105	2	232		156	12	1
Quebec...	3	1	11	20	10	18	42	6	25	91	15	242	4	189	22	4
Hudson Bay and Strait...																
Montreal...				7	7	6	19	6	26	162	7	240		157		
Prescott...			3	15	5	6	17	21	5	9	3	84		41	10	
Parry Sound...		5	10	22	13	11	53	31	32	63	21	261	2	145	25	
Kenora...							3		2	2	2	9		6		
Manitoba...				2			4		1	5	1	16		10		
Victoria...	3	1	3	7	7	1	10	59	9	6	18	124	1	63	19	
Prince Rupert...	1		3	3	1		3	32	1	3		47		15	7	
Total...	12	21	50	164	88	97	288	166	128	502	80	1,596	9	1,105	138	7

	Fog whistles	Sirens	Fog bells	Hand fog horns	Hand fog bells	Total fog signals	Fog signal stations only	Gas buoys	Gas and whistling buoys	Gas and bell buoys	Whistling buoys	Bell buoys	Total gas and signal buoys	Lightship subma- marine bells	Total submarine bells	Lighted spar buoys, floats and dolphins	Unlighted buoys	Stakes, buoys and barges	Unlighted tripods, floats, dolphins, spindles, and beacons
New Brunswick...	1		11	22			6	3	13	3	7	29	55	1	1		567	508	55
Nova Scotia...	1		2	45			2	6	20	11	18	43	98	1	1		1,021	12	9
Prince Edward Island...		1		9				3	4	4	3	12	26				897	1,674	6
Quebec...	4			22	4		1	61		8		1	70	3	3	1	278	100	41
Montreal...								103					103				561	170	128
Prescott...			4	5				37		1		1	39				546	76	3
Parry Sound...	2		4	32				37	4	11		3	55	1	1	29	549		58
Kenora...																	439		
Manitoba...				4												16	42		
Victoria...			12	5			1		4	4	2	3		1	1		172		92
Prince Rupert...			3	4			2		7	2			11				31		25
Total...	8	1	36	148	4	312	12	253	52	44	30	92	471	7	7	50	5,109	2,540	419

INCLOSURE No. 2.—Statement, by localities, giving the number of unlighted buoys, stakes, bushes, balises, tripods, floats, dolphins, spindles and beacons maintained throughout the Dominion.

NEW BRUNSWICK DISTRICT

Locality and Number of Stakes, Bushes, etc.	No. of Buoys	Locality and Number of Stakes, Bushes, etc.	No. of Buoys
Advocate Harbour, N.S.....	9	Letite, Ispindle.....	
Alma, Little Salmon River, N.B.....	3	Letite, L'Etang and Bliss harbour, N.B...	14
Apple river, N.S.....	8	Little Wood island.....	1
Apple river and sound, N.S.....	10	Lorneville, N.B., 1 spindle.....	1
Avon river, N.S.....	4	Magaguadavic, N.B.....	13
Bear river, N.S.....	7	Man o' War rock, L'Etang harbour, N.B..	2
Beaver Harbour, N.B.....	4	Maquapit and French lakes, N.B., 57 stakes	13
Big Duck island, Grand Manan.....	1	Mink island, L'Etang harbour, N.B.....	1
Blacks Harbour, N.B.....	3	Musquash, N.B.....	7
Bliss island, N.B.....	1	Old Man rock, N.S.....	1
Blonde rock, N.S.....	1	Old Woman rock, N.S.....	1
Brier island, N.S.....	1	Owl's head, N.S.....	1
Buck rock, Grand Manan.....	1	Ox Head ledges, N.B.....	3
Calf island bay, N.S.....	5	Parrsboro, N.S.....	6
Campobello, N.B.....	10	Pea point, L'Etang harbour, N.B.....	1
Chambers rock, N.B.....	1	Pease island, N.S.....	1
Chamcook harbour, entrance N.B.....	1	Perry point, Kennebecasis river, N.B., 12 bushes.....	
Chance harbour, N.B.....	2	Petitcodiac river.—.....	12
Chebogue, N.S.....	1	Pubnico, N.S., 4 stakes.....	17
Clark harbour, N.S.....	17	Quaco, N.B.....	1
Cockerwitt pass and Woods harbour, N.S. 1 spindle.....	17	Roaring Bull rock, N.S.....	1
Cumberland basin, N.S.....	2	Robinsons ball station, Wood Harbour, N.S.....	2
Deadmans head, l'Etang harbour, N.B...	1	St. Andrews, N.B., 3 stakes.....	17
Deer island N.B., 12 spindles in vicinity of island.....		St. Croix river, N.B.....	9
Digby and Annapolis, N.S.....	15	St. Andrews, N.B., 3 stakes.....	17
Digdequash, N.B.....	6	St. John harbour, N.B.....	3
Dipper harbour, N.B.....	5	St. John river, N.B., 150 stakes and bushes	87
Dochet island, St. Croix river.....	1	Salmon river, N.B., bushing.....	15
Freeport, N.S., 1 beacon.....	3	Schooner rock, N.S.....	1
Goose Bay, N.S., 35 stakes.....	8	Scotchtown, N.B.....	6
Grand lake, N.B., bushes.....	32	Shag harbour, N.S.....	17
Grand Manan, bay of Fundy, 2 spindles, 1 beacon.....	17	Shampiers wharf, N.B., 15 stakes.....	2
Grand passage, N.S., 2 spindles.....	5	Shulee, N.S.....	8
Grassy island, St. John river, 18 stakes....	7	Stay point, Lepreau river.....	1
Grindstone island bar.....	1	Tusket river, N.S.....	9
Gull ledge, N.S.....	1	Tusket Wedge, N.S., 3 spindles.....	17
Hatfield point, St. John river, 60 bushed stakes.....	1	Tynemouth creek, N.B.....	4
Indian point bar channel, Grand lake, 10 bushed stakes.....	1	Walton harbour, N.S.....	1
Johns ledge, N.S.....	3	Washadamoak lake, N.B., 144 bushes....	2
L'Etang, N.B., 1 spindle.....	1	West isles, N.B., 4 spindles.....	23
		Weymouth, N.S.....	16
		Yarmouth, N.S., 30 dolphins.....	11

NOVA SCOTIA DISTRICT

Arichat, West Arichat and Janvrin, C.B..	19	Clyde river, N.S.....	5
Barrington, N.S., 7 dolphins.....	45	Coddle harbour, N.S.....	6
Beaver harbour, N.S.....	10	Cooks Cove (Toby Cove), N.S.....	4
Beaver island, Nova Scotia, southeast coast.....	1	Country harbour, N.S.....	2
Beaver narrows, C.B.....	2	Crow harbour, N.S.....	3
Big Lorraine (Lorembec harbour), C.B....	3	Denny river, C.B.....	3
Birchtown, N.S.....	5	Descousse and Lennox passage, C.B., 5 winter buoys.....	29
Black rock shoal, off Dover, N.S.....	1	Devereux shaol, off Betty island, N.S.....	1
Blandford, N.S.....	5	Dover, N.S.....	7
Boulacet, Gillies point, C.B.....	1	Dover harbour entrance, Gannet shoal, N.S.....	1
Canso and St. Andrews passage, N.S., 20 buoys.....	32	East bay, Bras d'Or, C.B.....	5
Canso harbour entrance, N.S.....	3	East Chezzetcook and Petpeswick.....	10
Cape Negro and Northeast harbour, N.S..	17	East Dover, N.S.....	7
Chester and Gold river, N.S.....	28	Eskasoni, C.B.....	6
Christmas island and Barra strait, C.B...	11	Fourchu harbour, C.B.....	15

SESSIONAL PAPER No. 28

INCLOSURE No. 2.—Statement, by localities, giving the number of unlighted buoys, stakes, bushes, balises, tripods, floats, dolphins, spindles and beacons maintained throughout the Dominion—*Continued.*

NOVA SCOTIA DISTRICT—*Concluded*

Locality and Number of Stakes, Bushes, etc.	No. of Buoys	Locality and Number of Stakes, Bushes, etc.	No. of Buoys
Gegoggin, N.S.....	7	Petpeswick inlet, N.S.....	1
Glace bay, C.B.....	6	Pollock shoal, off West Ironbound island, N.S.....	1
Great Bras d'Or, C.B.....	7	Pope harbour, N.S.....	4
Guysborough, N.S.....	5	Port Bickerton, N.S., 3 winter buoys.....	5
Habitants bay, C.B.....	4	Port Felix, N.S., 1 staff.....	11
Halifax, N.S.....	19	Port Latour, N.S., 1 spindle.....	16
Harrigan Cove, N.S.....	3	Port L'Hebert, N.S.....	8
Hautfond shoal, off cape Hogan, C.B.....	1	Port Medway, N.S.....	6
Indian harbour, N.S.....	4	Port Morien, C.B.....	1
Ingonish, South bay, C.B.....	9	Port Mouton, N.S.....	9
Isaac harbour, N.S., 9 winter buoys.....	13	Pringle harbour, C.B.....	6
Jeddore, N.S., winter buoys.....	11	Prospect, lower, N.S.....	10
Johnson harbour, C.B.....	5	Prospect, upper, N.S.....	4
Ketch harbour, N.S.....	6	Ram rock, Jordan bay, N.S.....	1
Kieley Cove, Blind bay, N.S.....	4	River Bourgeois, C.B.....	6
Lahave river, entrance and Crooked chan- nel.....	11	Rose bay, lower, N.S.....	6
Lahave river, between Bridgewater and Dayspring.....	6	Roseway, N.S.....	5
L'Ardoise, C.B.....	5	St. Ann, C.B.....	12
Larry river, N.S., 7 stakes.....	3	St. Margaret bay, N.S.....	6
Liscomb, N.S., winter spars.....	7	St. Mary river, N.S., winter buoys.....	11
Little Bras d'Or harbour.....	18	St. Mary river to Sherbrooke, N.S.....	18
Little Dover, N.S.....	9	St. Peter bay, C.B., 4 winter buoys.....	17
Little Liscomb harbour, N.S.....	4	St. Peter inlet, C.B.....	12
Little Lorembec (Little Lorraine), C.B....	5	Sambro, N.S.....	29
Little Narrows, C.B.....	10	Shad bay, N.S.....	4
Liverpool, N.S.....	10	Shag bay, N.S.....	8
Lockeport, N.S.....	14	Sheet harbour, N.S., 5 winter buoys.....	9
Louisburg, C.B., 6 winter buoys.....	8	Shelburne, N.S., 3 winter spars.....	5
Lunenburg, N.S.....	8	Shenacadie harbour, N.S.....	2
Lunenburg, back cove, N.S.....	9	Ship harbour, lower, N.S., 6 winter buoys.....	11
Lunenburg, middle south, N.S., 6 winter buoys.....	16	Ship rock, strait of Canso.....	1
Mahone bay, N.S., 1 beacon.....	12	Slaughenwhite ledge, Hubbard cove, N.S.....	1
Main-a-dieu, C.B.....	5	Sober island to Ecum Secum, N.S.....	22
Marble Mountain, C.B.....	5	Spry bay, N.S.....	4
Marie Joseph and Ecum Secum, N.S., 11 winter buoys.....	16	Stoney island, Baddeck, C.B.....	1
Martins Brook, N.S.....	5	Sydney harbour, C.B.....	8
McKinnon Harbour, C.B.....	10	Tancook island, N.S.....	3
McNab cove, C.B.....	2	Tangier, N.S.....	7
McVarish shoal and Campbell point, Bras d'Or, C.B.....	4	Terence bay, N.S.....	3
Monsillier passage, C.B., 4 stakes.....	6	Three Fathom harbour, N.S.....	5
Musquodoboit, N.S.....	15	Tor bay, N.S.....	21
New Harbour, N.S.....	1	Voglers cove, N.S.....	6
Orangedale, C.B.....	3	Walkerville, C.B. (Inhabitants harbour).. Washaback river, C.B.....	3 7
Orpheus, off Green island, N.S.....	1	West bay, C.B.....	5
Pennant harbour, N.S.....	11	West bay, C.B. (Smith island).....	1
Petitdegrat, C.B., 6 winter buoys.....	18	West Chezzetcook, N.S.....	7
		West Dublin, N.S.....	12
		Whitehaven, N.S., 5 winter buoys.....	8
		Whycocomagh, C.B.....	4

PRINCE EDWARD ISLAND DISTRICT

Aldouane, N.B., 42 bushes.....	5	Brae harbour, P.E.I.....	5
Amherst harbour, Magdalen islands.....	8	Brudenell river, P.E.I.....	5
Baie du Vin, Huckleberry gully and chan- nel, N.B., 44 stakes and bushes.....	20	Brule, N.S.....	9
Baie Verte and Port Elgin, N.B., 30 stakes	6	Buctouche, N.B., 34 stakes.....	22
Bartibog and Black rivers, N.B., 12 bushes	1	Buctouche river, N.B., 260 bushes.....	
Bay Fortune, P.E.I.....	3	Cape Jack ledges, N.S.....	1
Beach Point, P.E.I.....	3	Cape Tormentine.....	2
Belle River, P.E.I.....	3	Cardigan, lower, P.E.I., 2 winter buoys..	7
Black brook, Miramichi river.....	3	Cardigan, upper, P.E.I.....	20
Black Lands Gully, N.B., 75 bushes.....	6	Caribou, N.S.....	6
		Cascumpeque, P.E.I., 14 stakes.....	15

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INCLOSURE No. 2.—Statement, by localities, giving the number of unlighted buoys, stakes, bushes, balises, tripods, floats, dolphins, spindles and beacons maintained throughout the Dominion—*Continued.*

PRINCE EDWARD ISLAND DISTRICT—*Concluded*

Locality and Number of Stakes, Bushes, etc.	No. of Buoys	Locality and Number of Stakes, Bushes, etc.	No. of Buoys
Charlottetown, P.E.I.....	9	Northport, N.S.....	12
Cheticamp, N.S.....	14	North river, P.E.I., 14 stakes.....	3
Chimney Corner, C.B.....	3	Orwell and Vernon rivers, P.E.I., 36 bushes, 4 beacons.....	3
Church rock, Magdalen islands.....	1	Pictou, N.S.....	11
Cocagne, N.B., 30 stakes.....	11	Pictou harbour (East river), N.S., 53 bushes.....	
Covehead, P.E.I.....	3	Pinette, P.E.I., 24 bushes.....	5
Crapaud, P.E.I., number of stakes.....	11	Pokemouche, N.B., bushes.....	6
East river, P.E.I., 15 stakes, 8 bushes.....	14	Port Borden.....	3
Egmont bay, north, P.E.I., 19 stakes.....	9	Port Hill, P.E.I.....	12
Egmont bay, south, P.E.I., 13 stakes.....	3	Port Hood, C.B., 2 winter buoys.....	5
Entry island and Amherst island passage (Magdalen islands).....	6	Pownall, P.E.I., 10 poles.....	9
Georgetown and St. Marys bay, P.E.I., 3 winter spars.....	19	Pugwash, N.S.....	8
Goose and Palmer harbours, P.E.I.....	5	Richibucto, N.B.....	38
Grand Entry, Magdalen islands.....	17	Richibucto (McBeath channel), 20 bushes, 35 stakes.....	
Grand Etang, C.B.....	4	Richibucto river, Rexton & Browns yard, N.B.....	30
Grandigue, N.B., 30 stakes, 20 bushes.....	2	Rifleman reef, P.E.I.....	1
Grand river (Boughton river), P.E.I., 80 bushed stakes, 1 beacon.....	12	River John, N.S., stakes.....	3
Grand river, off Cape Sixteen, Mapleque bay, P.E.I.....	8	River Phillip, N.S.....	6
Grand Tracadie, P.E.I.....	4	Rollo bay, P.E.I.....	3
Great Shemogue, N.B.....	9	Rustico, P.E.I., 30 bushed stakes.....	6
Grandstone reef, Magdalen islands.....	1	St. Charles river (Aldouane river), N.B., 60 bushes.....	
Harbour au Bouche, N.S., 6 stakes.....	4	St. Louis, N.B., 70 bushes.....	10
House Harbour, Magdalen islands.....	12	St. Louis river, N.B., 54 bushes and stakes.....	
Judique, C.B.....	1	St. Peter harbour, P.E.I., 6 stakes.....	5
Kouchibouguac gully, N.B., 75 bushes.....	9	Sandy Hook, Magdalen islands.....	1
Little channel, P.E.I.....	3	Savage harbour, P.E.I.....	2
Little Shemogue, N.B., 2 poles.....	5	Shedica, N.B., 5 winter buoys.....	14
Mabou, C.B., stakes.....	20	Shippigan, N.B., 27 pickets, 30 bushes, 1 beacon.....	27
Mapleque and Darnley, P.E.I., 5 stakes.....	22	Souris, P.E.I.....	4
Margaree harbour, C.B., 7 stakes.....	3	Stanley & Bayfield channel, Southwest river, Clifton bridge, P.E.I., 14 stakes.....	9
Merigomish, N.S., stakes and bushes.....	6	Summerside, P.E.I., 10 stakes.....	10
Meule rock, Magdalen islands.....	2	Tabusintac, N.B.....	20
Miminegash, P.E.I.....	6	Tatamagouche, N.S., 46 bushed stakes.....	18
Miramichi bay and river, 12 bushes, 12 winter spars.....	40	Terras shoal, P.E.I.....	1
Miramichi bay, Grandoon channel.....	20	Tidnish, N.S., stakes.....	7
Miramichi river, northwest branch.....	14	Tracadie, north gully, N.B., 100 bushes and stakes.....	12
Miramichi river, southwest branch.....	9	Tracadie, south gully, N.B., 30 bushes.....	5
Miscouche, P.E.I.....	1	Wallace, N.S., 33 stakes.....	11
Montague river, P.E.I., 10 stakes.....	7	West Point, P.E.I.....	4
Murray harbour and rivers, P.E.I., 25 stakes, 1 winter spar.....	32	West river, P.E.I., 65 stakes.....	8
Napan river, N.B., 24 bushes.....	3	Wood island, P.E.I.....	4
Neguac, N.B.....	19		
New London-French river, P.E.I., 15 stakes.....	8		

QUEBEC DISTRICT

Anse a Beaufile, P.Q.....	1	Caraquet, to Mizonette, N.B.....	3
Anse aux Gascons, P.Q.....	1	Carleton point, P.Q.....	1
Barachois de Malbaie, P.Q.....	1	Echourie rock (Serpent reef), P.Q.....	1
Bathurst, N.B.....	31	Fox river, P.Q.....	1
Beaudry shoal, Gaspé basin, P.Q.....	1	Grand Anse, N.B.....	4
Beauport, P.Q.....	3	Cros-cap-aux-Os, P.Q.....	1
Bersimis, P.Q.....	3	Little River East, P.Q.....	1
Bonaventure, P.Q.....	7	Little Shippigan (Miscou gully), N.B.....	4
Cap Chat, P.Q.....	1	Maria, P.Q.....	2
Cape Cove, P.Q.....	1	Matane, P.Q.....	2
Cape d'Espoir, P.Q.....	1	Miscou, N.B.....	8
Caraquet, N.B.....	16	Mistassini river, 50 balises.....	13

SESSIONAL PAPER No. 28

INCLOSURE No. 2.—Statement, by localities, giving the number of unlighted buoys, stakes, bushes, balises, tripods, floats, dolphins, spindles and beacons maintained throughout the Dominion—*Continued.*

QUEBEC DISTRICT—*Concluded*

Locality and Number of Stakes, Bushes, etc.	No. of Buoys	Locality and Number of Stakes, Bushes, etc.	No. of Buoys
Moisie river, P.Q.....	2	River St. Lawrence ship channel, 33 beacons, 8 spindles, 7 steel winter spar buoys	32
Natashkwan, P.Q.....	4	Roberval.....	6
New Richmond, P.Q.....	3	Ste. Anne river, P.Q.....	1
Nouvelle roads, P.Q.....	2	St. Godfroy, P.Q.....	1
Paspebiac, P.Q.....	1	St. Michel de Bellechasse, P.Q.....	4
Perce, P.Q.....	2	St. Simon bay, N.B., 15 stakes.....	6
Peribonka river, 35 balises.....	8	St. Thomas de Montmagny, P.Q.....	8
Petit Rocher, N.B.....	1	Saguenay river, vicinity of Chicoutimi, P.Q.....	33
Point St. Peter, P.Q.....	1	Saguenay river, Ha Ha bay.....	3
Port Daniel, P.Q.....	1		
Portneuf-en-bas, P.Q.....	9		
Restigouche river and Chaleur bay.....	22		
River St. Lawrence, North channel, Orleans island.....	13		

MONTREAL DISTRICT

Ottawa river district.....	87	St. Maurice river, Grandes Piles to Latuque, P.Q., 106 day beacons.....	74
Richelieu rapids, bushes.....		Yamachiche river, P.Q., 30 balises, 4 day beacons.....	
Richelieu river.....	66	Yamaska river, P.Q., 60 balises, 6 day beacons.....	
River St. Lawrence.....	326		
Riviere des Prairies, P.Q.....	11		
St. Francis river, P.Q., 80 balises, 12 day beacons.....			

PRESCOTT DISTRICT

Bay of Quinte.....	17	Murray canal and Presqu'ile bay.....	25
Cataraqui river.....	3	Napanee river.....	17
Kingston.....	9	Pictou harbour.....	6
Lake Ontario, Melville shoal.....	1	River St. Lawrence, 5 beacons.....	87
“ N.E. of Snake island.....	1	Telegraph narrows.....	10
“ S.E. end of Snake island shoal.....	1	Trent canal (maintained for this Department by Department of Railways and Canals).....	317
“ S.W. end, Snake island shoal.....	1	Trenton harbour.....	15
“ off Long point, Wolfe island.....	1	Whitby.....	5
“ E. of Presqu'ile light.....	1		
Lake St. Francis.....	29		

PARRY SOUND DISTRICT

Ann Long bank, Georgian bay.....	1	Kennedy bank, Georgian bay.....	1
Bar point, Georgian Bay.....	1	Key Harbour channel, Georgian bay, 6 beacons.....	24
Bad Neighbour shoal, entrance to Georgian bay.....	1	Killarney harbour, Georgian bay.....	3
Bernard rock, Georgian bay.....	1	Lake Couchiching and narrows, 11 bushes.....	8
Blind river, North channel, lake Huron...	6	Lake Simcoe.....	5
Burke shoal, lake Superior.....	1	Lake Timiskaming, North Timiskaming, 20 stakes.....	
Byng inlet channel, Georgian bay, 6 beacons.....	27	“ Ville Marie channel... ..	7
Campbell rock, Georgian bay.....	1	“ Wabi creek, 5 stakes.. ..	
Cape Hurd, lake Huron, 2 day beacons...	3	Lionshead harbour, Georgian bay.....	1
Clapperton channel, North channel, lake Huron, 1 beacon.....	8	Little Current, North channel, lake Huron	27
Cloud bay, lake Superior.....	2	Mary Ward ledges, Georgian bay.....	4
Collingwood, Georgian bay.....	15	Meaford harbour, Georgian bay.....	3
Dawson rock, Georgian bay.....	1	Michipicoten island (Quebec harbour), lake Superior.....	6
Detroit river.....	30	Midland and Victoria harbours, Georgian bay.....	5
Fort William, lake Superior.....	13	Morden rock, Georgian bay.....	1
Goderich, lake Huron.....	7	Mutton island, lake Superior.....	1
Jackson shoal, Georgian bay.....	2		

INCLOSURE No. 2.—Statement, by localities, giving the number of unlighted buoys, stakes, bushes, balises, tripods, floats, dolphins, spindles and beacons maintained throughout the Dominion—*Concluded*.

PARRY SOUND DISTRICT—*Concluded*

Locality and Number of Stakes, Bushes, etc.	No. of Buoys	Locality and Number of Stakes, Bushes, etc.	No. of Buoys
Northeast shingle, Georgian bay.....	1	River Thames, lake St. Clair.....	7
Ottawa river, above Pembroke, Ont.....	30	Rondeau, lake Erie.....	6
Owen Sound channel, Georgian bay.....	4	St. Joseph channel, lake Huron, 1 beacon, 5 winter buoys.....	25
Parry Sound ship channel, 2 beacons.....	20	Shebeshekong channel, Georgian bay, 22 day beacons.....	7
Parry Sound to Waubaushene, Georgian bay inner channel.....	116	Southampton, lake Huron.....	4
Penetanguishene, Georgian bay.....	12	South Baymouth, lake Huron.....	6
Pointe au Baril and Kennedy shoal, Georgian bay, 15 beacons.....	3	Stokes bay, lake Huron.....	16
Port Arthur, lake Superior.....	25	Sturgeon river, Monetteville and Cache Bay, 28 bushed stakes.....	3
Port McNicoll, Georgian bay.....	2	Sutton river, 12 bushed stakes.....	5
Port Rowan, lake Erie.....	10	Victoria island, lake Superior.....	4
River St. Clair, chenal Ecarte.....	1	Wabuno channel, Georgian bay, 3 beacons.	
“ middleground	1	Wingfield basin, Georgian bay.....	
River St. Mary and east end of lake Superior.....	21		

KENORA DISTRICT

Lake of the Woods.....	345	Wabigoon lake.....	22
Rainy lake.....	27	Winnipeg river, White Dog to Kenora.....	24
Shoal lake.....	21		

MANITOBA DISTRICT

Black river, lake Winnipeg.....	6	Red river.....	17
Lake Winnipegosis, entrance Pine creek....	7	Warrens landing, lake Winnipeg.....	12

VICTORIA DISTRICT

Active pass, 1 beacon.....		Mud bay, Serpentine and Nicomeck'l rivers, 3 beacons, 27 dolphins.	
Arrow lakes.....	21	Nanaimo harbour and Departure bay, 1 beacon.....	13
Baynes sound and approaches, 1 beacon....	10	Nanoose harbour.....	1
Broughton strait.....	1	Okissolla channel, 3 beacons.....	2
Browning passage, 1 beacon.....		Pender island canal.....	9
Burrard inlet and Vancouver harbour, 2 beacons.....	8	Pitt river.....	1
Clayoquot sound, 3 beacons.....	12	Prevost passage.....	2
Colbourne passage, Colburne channel.....	2	Quatsino sound, 2 beacons.....	2
Courtenay river, 12 pile dolphins.....		Richard rock, Barkley sound, 1 beacon....	2
Esquimalt harbour, 2 beacons.....	4	Saanich inlet, 1 spindle, 1 beacon.....	1
False narrows.....	2	Satellite channel, 2 beacons.....	1
Fraser river.....	38	Shushartie bay, 1 beacon.....	1
Ganges harbour.....	2	Shute passage.....	5
Georgia strait, 2 beacons, 1 set range day marks.....	7	Sidney channel, 1 beacon.....	4
Haro strait, 1 beacon.....	2	Stuart channel and approaches, 4 beacons, 1 pile dolphin.....	2
Houston passage.....	1	Sutil channel, 1 pile dolphin.....	3
Johnstone strait, 4 beacons.....	2	Trincomali channel and Porlier pass, 5 beacons.....	1
Juan de Fuca strait.....	1	Ucluelet harbour, 1 beacon.....	1
Kootenay lake, northwest arm.....	7	Victoria harbour, 2 beacons.....	
Kyuquot sound, 1 beacon.....	1		
Malaspina strait, 3 beacons.....	2		

PRINCE RUPERT DISTRICT

Chatham sound, 1 beacon.....	7	Port Simpson.....	1
Fitzhugh sound, 1 beacon.....	1	Prince Rupert harbour, 1 beacon.....	2
Grenville channel, 3 beacons.....	1	Queen Charlotte islands, 4 beacons.....	2
Lama passage, 3 beacons.....		Seaforth channel, 3 beacons.....	2
Metlakatla.....	9	Skeena river and passages, 5 beacons.....	
Observatory inlet, 3 beacons.....	3	Tolmie channel, 1 beacon.....	
Porpoise harbour.....	6		

RIVER ST. LAWRENCE SHIP CHANNEL

REPORT OF V. W. FORNERET, B.A.Sc., M.E.I.C., SUPERINTENDING ENGINEER

GENERAL INFORMATION

The Ship channel of the river St. Lawrence, between Montreal and Father Point, has a total length of 340 statute miles.

The contracted part of the river, which may properly be called "Ship channel" commences at the "Traverse", 60 miles below Quebec, which is 220 miles from Montreal by South channel. The uncompleted North channel commences at Goose cape, a distance of 226 miles from Montreal. The completed channel has a minimum width of 450 feet and on the curves from 500 to 800 feet.

It is probable that there is no river in the world better adapted for improvement than the St. Lawrence. The Great Lakes act as storage reservoirs and settling basins, and except for floods during the ice accumulations, the fluctuations in level are gradual and not excessive.

The position of the St. Lawrence is the reverse of most rivers. The usual condition of a river is, from the source, steep slopes which erode the banks and transport coarse material, which, as the slope becomes more gradual, decreases until at the mouth of the river the water carries in suspension a fine sediment which deposits, to the great detriment of navigation.

In the St. Lawrence the material from most of the sources of supply is all deposited in the settling basins. From the lakes to the ocean the bottom of the river is usually hard, so that we have not only clear water, but a permanent bed.

The nature of the material composing the bottom of the river, though in many places very difficult to dredge, is for the same reason of such a character that a dredged cut once made is substantially permanent.

In the Ship channel the material to be excavated varies from soft blue clay to hard pan as hard as a macadamized road, shale rock and large boulders. In one or two localities is found coarse sand, to which points dredging has to some extent to be repeated. The currents of the St. Lawrence are, for a river of such a size, not only reasonable and regular, but altogether free from the usual dangers to navigation resulting from freshets. The winter season, with its ice and snow, is the one drawback to the St. Lawrence. This route, however, with its seven months' season of navigation, is one of the greatest factors in the success of the Canadian transportation system.

The St. Lawrence owing to its situation, is the natural route from the Atlantic to the northern and northwestern half of the North American Continent.

The opening of the Lachine canal, connecting Montreal with the Great Lakes in 1825, established the route commercially.

The first steamboat to churn the waters of the St. Lawrence was the *Accommodation*, which was 85 feet long. This boat started on her first trip from Montreal to Quebec on November 3, 1809. The trip occupied 66 hours, 30 of which she was at anchor, so that the actual time for the passage was 36 hours. At the present time some of the largest ocean liners make the run in about 8 hours. The building of the *Accommodation* was due to the enterprise of Mr. John Molson, an ancestor of the present well known Molson family of Montreal.

DEPTH OF WATER IN THE SHIP CHANNEL, SEASON 1922

Although the depth of water in the Ship channel was very low for a short period during the month of November, 1922, the Sorel gauge reading as low as

30 feet 1 inch in the 30-foot channel, the average height of water per month for the season of navigation was higher than the two previous seasons with the exception of November as can be seen by the following table:—

Year	May	June	July	Aug.	Sept.	Oct.	Nov.	Highest	Lowest
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
1920.....	35 9	33 0	32 4	31 8	31 5	31 4	31 6	37 5	30 1
1921.....	35 6	32 9	31 10	31 4	31 10	31 4	31 6	37 8	30 2
1922.....	37 1	34 9	33 4	32 3	31 7	31 4	30 11	40 5	30 1

TIDAL SEMAPHORES

The tidal Semaphore at Cap à la Roche (Deschaillons P.Q.) on the south shore which shows the available depth of water in the dredged channel, commenced operations on April 25, 1922. The tidal semaphore at Pointe Citrouille, on the north shore, which also shows the deptl. of water in the Cap à la Roche channel, commenced operations on same date. The Cap à la Roche and Pointe Citrouille semaphore stations are connected by a special telephone line to enable the operator at Cap à la Roche station to telephone every 3-inch rise and fall of the tide to the operator at Pointe Citrouille. The semaphore at Point Citrouille enables the pilots of deep draught vessels outward bound to judge if there is sufficient depth of water in the Cap à la Roche channel to allow them to pass with safety. Should there not be enough water, they can anchor just below Pointe Citrouille station where there is a splendid anchorage ground, and wait for the tide to rise.

The tidal semaphore at St. Nicholas Point on the south shore, which shows the depth of water available in the channel over the undredged St. Augustin bar, commenced operations on April 26, 1922.

SWEEPING OF SHIP CHANNEL

The usual annual sweeping of the Ship channel was carefully done and no obstructions of a serious nature were found.

A great deal of extra sweeping was carried on above and below Quebec to prove certain areas. A new sounding scow was built equipped with complete sweeping machinery. It is operated by a tug pushing it ahead.

This sweeping scow with the sweeping steamer *Detector* will enable a larger amount of sweeping and examination of the Ship channel to be done during the season of navigation.

PERMANENT BEACONS FOR PLACING CHANNEL BUOYS

Very good progress has been made in erecting permanent beacon ranges for placing and checking the position of the channel buoys. This work is being done by the Ship channel staff and is proving of great value.

These have been completed from Montreal harbour to Ile au Raisin traverse, lake St. Peter, Three Rivers to Pointe Citrouille and also Cap Charles channel. It is proposed to erect a certain number every season until the whole system is completed.

DREDGING OPERATIONS

The dredging operations on the river St. Lawrence Ship channel for 1922 were carried on with the same number of dredges, tugs, etc., as in 1921.

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The plant consisted of five dredges, one rock breaker and the necessary attending tugs, scows, stone-lifters, etc.

Cap à la Roche.—One powerful dredge was employed at Cap à la Roche all season deepening and widening the channel to 30 feet at extreme low water of 1897, assisted by a rock breaker and stone lifter and attending plant.

Good progress was made notwithstanding the hard nature of the shale rock to be removed, and the numerous boulders to be lifted.

A great deal of time was lost by the dredge on account of having to get out of the way of passing steamers, which were more numerous this year than ever.

A large area of rock has been broken by the rock breaker in preparation for next season's work and several hundred boulders were lifted by the stone lifter.

The total number of cubic yards dredged during the season of 1922 amounted to 49,400 at a total cost of \$54,059.90, or $\$1.09^{43}_{100}$ cents per cubic yard. The material being very hard shale rock.

Champlain Channel.—One dredge was also operated in the Champlain channel during most of the season cleaning up sand bars that had been found by the sweeping steamer *Detector* but these were removed before the low water season.

The amount of material dredged during the season of 1922 amounted to 99,750 cubic yards at a total cost of \$44,154.98, or 44^{27}_{100} cents per cubic yard. The material being sand.

Ste. Anne Curve.—Dredging to 35 feet was also done at Ste. Anne curve below Sorel.

The total number of cubic yards removed amounted to 123,200 at a total cost of \$43,223.28, or 35^{09}_{100} cents per cubic yard, the material being clay.

Contrecoeur Channel.—Some dredging to 35 feet at E.L.W. was done on the south half of Bellmouth curve, the north half being completed, and also at upper end of Contrecoeur traverse.

The total number of cubic yards dredged amounted to 78,250 at a total cost of \$43,073.37, or 55^{05}_{100} cents per cubic yard, the material being clay.

Contrecoeur to Vercheres Channel.—A large amount of dredging was done to 35 feet at E.L.W. of 1897 on the Contrecoeur to Vercheres channel, which was practically completed.

The total number of cubic yards dredged amounted to 311,750 at a total cost of \$151,361.28, or 48^{55}_{100} cents per cubic yard, the material being clay, stones and boulders.

North Channel Below Quebec.—The new powerful sea-going elevator dredge built at Canadian Vickers, Ltd., Montreal, was placed to work at 35 feet at E.L.W. of 1897 in the North channel at East narrows, the material consisting of coarse sand, gravel and numerous boulders, some of large size. Although the dredge was completed and put into commission late in the season, considerable work was accomplished.

It is expected that good progress will be made next season with this dredge.

The total number of cubic yards removed amounted to 89,975 at a total cost of \$83,706.11, or 93^{03}_{100} cents per cubic yard, the material consisting of sand, gravel, clay, stones and boulders.

The dredge was brought up to work for a short time to widen and deepen the entrance to the St. Charles river, Quebec harbour, and removed 41,025 cubic yards of material consisting of sand, gravel, stones and some boulders which was very hard to dredge in some places. The total cost amounted to \$45,657.88, or $\$1.11^{29}_{100}$ cents per cubic yard.

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The total number of cubic yards dredged during the season of 1922 amounted to 793,350 cubic yards, at a total cost of \$465,236.80, or $58\frac{64}{100}$ cents per cubic yard.

Progress of Dredging Operations at the End of the Season of 1922

Thirty-foot Project—

Total length of dredging done.....	66.61 miles
Total length of dredging yet to be done.....	1.44 "
Total number of cubic yards dredged.....	53,586,327
Total number of cubic yards yet to be dredged.....	1,715,005

Thirty-five-foot Project—

Total length of dredging done.....	42.01 miles
Total length of dredging yet to be done.....	46.98 "
Total number of cubic yards dredged.....	39,876,426
Total number of cubic yards yet to be dredged.....	26,984,790

The total cost from 1851 to the end of the fiscal year ending March 31, 1923, of the Ship channel from Montreal to Father Point, including plant, shops, surveys, etc., is as follows:—

Dredging.....	\$16,326,206 49
Plant, Shops, Surveys, etc.....	8,835,453 66
Total.....	<u>\$25,161,660 15</u>

The total number of cubic yards of material dredged from 1851 to the end of the season of 1922, amounted to 120,129,483, the material varying from very hard shale rock to soft blue clay.

ACCIDENTS IN THE ST. LAWRENCE RIVER, SEASON, 1922

Between Montreal and Quebec

April 25.—SS. *Mapledawn*, Canada Steamship Lines, inward bound, went aground 3 miles west of cap St. Michel, on south side of channel. Was refloated apparently undamaged.

May 7.—SS. *W. H. Libby* (oil tanker) Standard Oil Company, grounded for about one hour near gas buoy No. 4, L. Poulier Laforce, lake St. Peter. Apparently not damaged.

June 3.—SS. *Montcalm*, Canadian Pacific Railway outward bound, went aground outside of Ship channel on south side off ile Bigot, a short distance above Champlain, was refloated. Bottom damaged, had to go into drydock at Levis for repairs.

July 1.—SS. *Cairndhu*, Cairn Line, inward bound, and tug *Spray*, Sincennes, McNaughton Co., collided 5 miles west of Sorel. Tug *Spray* sank outside channel, six lives lost.

July 24.—SS. *Tyrrhenia*, inward bound, broke with her mast several wires of the Shawinigan Power Company's Transmission Line stretched across the St. Lawrence river immediately west of Three Rivers, P.Q.

August 11.—SS. *Indochine*, French Government, inward bound, and ss. *Sarmatio*, Danish, outward, collided off Three Rivers, P.Q. Both vessels went aground outside of channel on south side, were refloated next day. Both vessels had to go into dry-dock for repairs.

September 3.—SS. *Eiberger*, Dutch vessel, went aground for short time off Batiscan, was refloated apparently not damaged.

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September 15.—SS. *Comino* outward, went aground outside of channel on north side at ile Ste. Therese. Was refloated without any damage.

September 23.—SS. *Colonian*, inward bound, went aground for a short while half mile west of Quebec bridge on north side, then proceeded up apparently undamaged.

September 27.—SS. *Spilsby*, outward bound, in collision with the ss. *Sinasta*, inward bound, between St. Nicholas and Bridge Station. No apparent damage.

September 30.—SS. *Cymric Queen*, inward, struck a barge in tow of tug *Gerald Morgan* on lake St. Peter. The barge grounded outside of channel.

October 13.—SS. *Orkild* and ss. *Izged*, both bound for Montreal, were in collision in Cap Charles channel. No damage.

October 15.—SS. *Glenmoor*, loaded with coal, while being towed out from Canada Cement wharf, Longue Point, bound for Windmill Point, grounded between bank of channel and wharf. Was refloated undamaged.

October 18.—Steambarge *Linden*, outward from Montreal, went aground one mile west of Bellmouth Signal Station. Was refloated undamaged.

November 10.—SS. *Beckingham*, outward bound, went aground about 2 miles east of Cap St. Michel Signal Station. Was refloated undamaged.

November 18.—SS. *Calgarolite* (oil tanker) inward bound, struck one of the floating pontoons at the Champlain Market landing, Quebec harbour. The pontoon was badly damaged and sunk and the Island of Orleans ferry boat *Frontenac* was also damaged.

November 21.—SS. *Cairndhu*, outward bound, went aground off the Experimental Farm, cap Rouge, above Quebec, on north side. Bottom badly damaged. Was refloated and placed in the Levis drydock for repairs, where she remained all winter.

October 17.—SS. *Modica*, inward, went aground outside of channel off the Imperial Oil Company's wharf at Pointe aux Trembles. Was refloated undamaged.

December 5.—Tug *Sin Mac*, belonging to the Sincennes, McNaughton Line, with coal barge (light) in tow, went aground off Champlain river and got off at flood tide and proceeded up.

Quebec to Father Point

July 5.—SS. *Orthia*, Donaldson Line, inward, in collision with ss. *Airedale*, outward, 2 miles off White Island Lightship. Both ships damaged, Steamer *Orthia* had to be beached. She was refloated and was sold to be broken up. The ss. *Airedale* returned to Quebec, and went into drydock for repairs.

August 26.—SS. *Baluchistan*, outward, went ashore on White island. Was refloated and returned to Quebec and went into drydock at Levis for repairs.

NOTE.—The above accidents between Montreal and Quebec, and Quebec and Father Point cannot be attributed to any fault of the Ship channel.

MARINE SIGNAL SERVICE

March 31, 1923

Signal stations have been established for the purpose of maintaining communication between ship and shore by means of flag signals.

This system of stations extends from St. John, N.B., Halifax, N.S., Cape Race, Newfoundland, and Belle Isle up the gulf and river St. Lawrence and through the Great Lakes to Sault Ste. Marie, Ont.

Following is a complete list of stations:—

EAST OF QUEBEC

Name of Station	Location	Nautical miles from Quebec	Means of Communication
(R.)—Quebec.....	Custom House.....	0	Telephone
Crane Island.....	Lighthouse.....	14	"
L'Islet.....	100 yards east of church...	40	Telegraph
Cape Salmon.....	Lighthouse.....	81	Telephone and telegraph
Father Point.....	Shore end of wharf.....	157	Telegraph
Little Metis.....	Lighthouse.....	175	"
Matane.....	".....	200	"
Pointe des Monts.....	".....	219	"
Cap Chat.....	".....	234	"
Riviere a la Martre.....	".....	260	"
Cape Magdalen.....	".....	294	"
Fame Point.....	".....	325	"
Cap des Rosiers.....	".....	349	"
Cap d'Espoir.....	".....	377	"
Point Maquereau.....	".....	400	"
West Point, Anticosti.....	".....	332	"
Southwest Point, Anticosti.....	".....	360	"
South Point, Anticosti.....	".....	415	"
Heath Point, Anticosti.....	".....	438	"
Point Escuminac, N.B.....	".....	462	"
Amherst Island, Magdalen Islands....	".....	481	"
St. Paul's Island, C.B.....	Main station.....	540	Telephone
Money Point, C.B.....	Lighthouse.....	537	"
Flat Point, N.S.....	".....	575	Telegraph
Cape Ray, Nfld.....	".....	553	"
Cape Race, Nfld.....	".....	826	"
Point Amour, Labrador.....	".....	673	Wireless telegraph
Belle Isle.....	".....	734	" "
Camperdown, N.S.....	Near wireless station.....		Telephone
Halifax, N.S.....	The Citadel.....		"
Brier Island, N.S.....	Near lighthouse.....		"
Point Lepreaux, N.B.....	Lighthouse.....		"
Partridge Island, N.B.....	".....		"
St. John, N.B.....	Custom House.....		"
Point Tupper, C.B.....			Telegraph
Seatarl Island, C.B.....			"

WEST OF QUEBEC

Name of Station	Location	Nautical miles from Quebec	Means of Communication
Bridge Station.....	Half mile above Quebec Bridge on south shore...	6	Telephone
St. Nicholas.....	At tidal semaphore.....	12	"
Portneuf.....	In front lighthouse.....	31	"
Grondines.....	In old windmill tower.....	41	"
St. Jean Deschaillons.....	At tidal semaphore.....	45	"
Pointe Citrouille.....	In lighthouse.....	55	"
Three Rivers.....	Upper end of Bureau wharf	68	"
Sorel.....	Lower end of Government wharf.....	100	"
Bellmouth.....	About 500 feet east Contre cour Course, low light..	110	"
Cap St. Michel.....	Abreast east end Ile des Lauriers.....	125	"
Longue Pointe.....	Point between wharves...	134	"
R.—Montreal.....	92 Notre Dame St. East (La Sauvegarde Bldg.).	139	"

WEST OF MONTREAL

Name of Station	Location	Nautical miles from Montreal	Means of Communication
R.—Lachine Canal.....	Lock No. 2.....	0	Telephone
R.—Lachine Canal.....	Lachine.....	8	"
R.—Soulanges Canal.....	Cascades Point.....	21	"
R.—Soulanges Canal.....	Coteau Landing.....	33	"
R.—Cornwall Canal.....	Cornwall.....	62	"
R.—Galops Canal.....	Lift Lock.....	99	Telegraph
R.—Welland Canal.....	Port Dathousie.....	298	"
R.—Welland Canal.....	Port Colborne.....	321	"
R.—Soo Canal.....	Sault Ste. Marie.....	820	"

Stations marked thus "R" are reporting stations only and are not equipped for signalling purposes.

BRIEF SUMMARY OF WORK PERFORMED

1. Stations report movements of vessels to Montreal, Quebec, Sydney, Halifax or St. John.

2. Stations report weather conditions daily to Montreal, Quebec, Sydney, Halifax or St. John.

3. Montreal, Quebec and St. John publish daily bulletins giving weather and ice conditions and movements of vessels.

4. Montreal and Quebec publish daily bulletins showing depths of water at various points in the river St. Lawrence Ship channel.

5. The Signal Service offices at Montreal, Quebec and St. John are opened day and night for the purpose of furnishing the public with information of shipping matters.

6. The telegraph system of the Department of Public Works on the north shore of the gulf of St. Lawrence, report the movements of vessels engaged in the coasting trade to the Signal Service at Quebec.

7. The collectors of customs at all the seaports in the river and gulf of St. Lawrence, on the Atlantic coast and in the overseas trade.

8. Lloyd's agents at Quebec are furnished daily with full information of the movements of vessels engaged in the overseas trade to and from ports in the province of Quebec.

9. Lloyd's agents at St. John, N.B., are furnished daily with full information of the movements of vessels engaged in the overseas trade to and from ports in the Maritime Province.

ICE-BREAKING, 1922-23.

(REPORT of N. B. McLEAN, ENGINEER (RIVER ST. LAWRENCE SHIP CHANNEL), on the work of the ice-breaking steamers *Lady Grey*, *Montcalm* and *Mikula* during the winter of 1922-23.

The winter of 1922-23 was of long duration and exceptionally severe. The ice bridge formed at Port St. Francis and Sorel on December 9, and by December 17, the river was covered with ice from Port St. Francis to Montreal. On December 20, a jam formed at Batiscan, and in a few days the ice had backed up to Port St. Francis. From Batiscan down, the river remained open.

On November 21, the *Lady Grey* went to Three Rivers to keep Port St. Francis open and to assist ships in the ice. She was joined on December 4, by the *Bellechasse*. No great difficulty was experienced. On the night of December

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8-9, the ice blocked at Port St. Francis and from the Sorel islands to above Sorel point. The steam barge *J. S. Thom* on her way to Quebec was caught in this ice and remained fast. It was considered to be too dangerous an undertaking to attempt to break up Lake St. Peter and the ice from Sorel islands to Sorel point, so she had to be left there for the winter. An attempt was made by departmental tugs working from Sorel to reach her, but it had to be given up as the weather turned very cold, and there was danger that these tugs might also have to winter outside in the ice. The *Lady Grey* and *Bellechasse* left Three Rivers, December 9, and escorted the ss. *Couta* and the ss. *Grey Point* to Quebec. On December 10, they proceeded down with the *Couta*, *Turret Cape* and *Turret Court*, taking them as far as Murray Bay, where they were clear of ice, and returning to Quebec the next day, the *Lady Grey* taking up her station there for the winter work, the *Bellechasse* going into winter quarters.

During the period from December 11, to March 5, when the ice-breakers were on the Quebec station, two ice jams formed at Quebec bridge, which were broken up by the *Mikula* and *Lady Grey*, and on several occasions, large fields of batture ice, which would have formed a block, were broken above Cap Rouge. At Portneuf during the same period the ice jammed twice, but on each occasion the *Mikula* was able to clear the obstruction in a most satisfactory manner. The ability of this vessel to break up the heavy jams that form at this point should prove to be a factor of considerable importance in the ice breaking work for the reason that the farther up the river can be kept clear of ice the less work there is for the ice breakers in the spring, and the earlier it can be opened.

Owing to the fact that the *J. S. Thom* had wintered in the ice above Sorel, it was decided to commence the operation of opening the upper reaches of the river at an early date, and to endeavour to release her from her dangerous position.

On March 5, the *Mikula* proceeded up river to the foot of the ice about one mile below Batiscan and began work. By March 12, she had arrived at Three Rivers, having cut through 21 miles of heavy winter ice from 20 feet to 24 inches in thickness with here and there heavy ridges of packed ice and banks of frazil.

The *Mikula* left Three Rivers on March 13 for Quebec, to have an examination made of the port side propeller, which was giving trouble. While pass-through cap a la Roche curve, she was caught in a snow flurry and went aground, about 9 a.m., remaining hard and fast. The tide was going out and there was no possibility of release until rising tide. Everything possible was done, but her bottom was punctured and the after stokehold filled up. About 5 p.m. near the top of high water, she came off. She was immediately taken to a place of safety and grounded below St. Jean wharf. Salvage pumps were sent from Quebec and by March 15, the water was under control, but owing to thick weather the ship did not reach Quebec until March 17.

An examination was immediately made of the *Mikula*, and temporary repairs undertaken, but as the dry docks were not available, and as there was not enough water for her on the Gridiron at Levis, the work could only be done by divers, and was consequently very slow.

The *Lady Grey* and *Montcalm* took up the work where it had been left off by the *Mikula*, and carried on steadily until March 24, when a heavy batture broke away and blocked near pointe Citrouille, both ships being above at the time. Every effort was made to break through this from above, but without success, and these ships had to return to Three Rivers and tie up, as it was not advisable to break more ice above, which would float down and perhaps create a really serious jam that might cause floods.

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Periodically attempts were made by the *Lady Grey* and the *Montcalm* to get through the jam at pointe Citrouille from above, but as the weather remained very cold and there was practically no softening of the ice, they were unsuccessful.

On April 17, the *Mikula*, which had been temporarily repaired, came up and succeeded in releasing the *Lady Grey* and *Montcalm*.

The *Montcalm* was withdrawn from above on April 20, in order to proceed to the Gulf. The *Mikula* was not in sufficiently good shape for anything but emergency work and remained at Quebec, so it fell to the lot of the *Lady Grey* to complete the work in the upper river.

By this time any idea of reaching the *J. S. Thom* above Sorel had to be given up as the ice was getting soft, and it was too dangerous to attempt cutting through lake St. Peter.

On April 24, the lake ice moved and by April 27, the lake was clear, the *Lady Grey* passing up and working at a very heavy jam above Sorel.

During the late afternoon of April 25, the *J. S. Thom* broke away from the position she had been in all winter and moved down, but still fast in the ice. Luckily there were large spaces of open water and the C.G.S. *Berthier* was able to go out and free her from the ice by which she was surrounded, and succeeded in reaching Sorel harbour in safety.

The *Lady Grey* was engaged in breaking up jams in the vicinity of Sorel from April 27, to April 29, finally reaching Montreal on the latter date in the late afternoon.

At the request of the Department of Railways and Canals, the *Lady Grey* proceeded to lake St. Louis on April 30, broke up an accumulation of frazil ice at the entrance to the Soulanges canal, and returned to Montreal on May 3. This brought to a close the ice breaking operations for 1922-23.

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AVERAGE depth for each Month in the 27½-foot Channel. (27½ feet at Ordinary Low Water from Sorel Gauge each year, May to November.)

Year	May		June		July		Aug.		Sept.		Oct.		Nov.		Highest		Lowest	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
1892	31	0	31	9	31	6	30	6	28	9	28	3	28	3	33	6	27	3
1893	36	0	34	3	30	9	29	9	29	6	28	6	28	0	37	6	27	6
1894	34	6	31	9	31	0	29	2	28	3	28	9	29	0	36	0	27	7
1895	33	3	31	3	28	3	28	3	27	6	26	9	26	9	34	6	25	10
1896	33	6	30	6	28	9	28	0	27	6	27	9	29	0	37	0	27	4
1897	35	6	32	6	30	3	29	3	28	0	27	0	27	6	37	0	26	5
1898	31	6	30	9	29	8	28	2	28	2	28	3	28	6	32	1	26	9
1899	36	2	31	9	30	3	28	6	27	6	28	0	27	9	37	9	26	9
1900	33	6	30	9	30	6	29	6	28	1	28	9	29	2	35	9	27	4
1901	34	3	31	10	29	2	28	3	27	7	27	4	27	3	36	3	26	6
1902	32	2	32	2	32	2	29	4	28	1	28	1	29	0	34	1	27	6
1903	33	0	30	11	30	5	29	5	28	4	29	0	27	11	32	8	26	11
1904	36	3	34	5	30	9	29	5	29	5	30	4	29	3	37	4	28	1
1905	31	10	30	8	29	7	29	0	28	0	28	5	28	1	33	6	27	1
1906	32	4	31	5	29	3	27	11	27	3	27	4	27	6	33	3	26	9

AVERAGE depth for each Month in the 30-ft. Channel. (30 feet at Extreme Low water of 1897)

1907	37	1	35	9	34	3	32	10	32	4	32	9	33	7	38	3	31	10
1908	41	5	37	10	33	10	32	10	32	0	31	0	30	6	42	4	30	0
1909	40	6	37	6	33	10	33	2	32	7	32	4	31	6	42	7	30	11
1910	35	7	34	5	32	3	31	7	31	6	31	6	31	7	37	1	30	7
1911	36	6	34	6	32	1	31	3	30	9	30	2	30	3	38	1	29	4
1912	37	9	37	6	33	6	32	8	32	6	32	6	34	9	40	11	31	3
1913	37	0	34	4	32	8	31	10	31	6	32	1	32	7	38	6	31	1
1914	35	2	33	0	32	4	31	4	31	3	30	11	31	0	36	10	30	3
1915	34	7	32	6	31	6	31	4	31	1	30	11	30	8	37	4	30	1
1916	38	9	37	2	34	0	32	5	31	7	31	9	31	10	40	0	30	9
1917	36	8	36	6	34	10	33	6	32	3	32	6	33	0	38	2	31	3
1918	36	1	34	1	33	10	32	0	32	3	33	7	34	11	38	1	31	3
1919	39	7	36	7	33	5	32	4	32	3	32	8	33	5	41	1	31	3
1920	35	9	33	0	32	4	31	8	31	5	31	4	31	6	37	5	30	1
1921	35	6	32	9	31	10	31	4	30	10	31	4	31	6	37	8	30	1
1922	37	1	34	9	33	4	32	3	31	7	31	4	30	11	40	5	30	1

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COST OF SHIP CHANNEL TO DATE

TABLE Showing the Total Cost of the Dredging and Plant and the Quantities Dredged to March 31, 1923.

	Cost of Dredging	Expenditure for plant, shops, surveys, etc.	Quantities dredged
	\$ cts.	\$ cts.	Cu. yds.
MONTREAL HARBOUR COMMISSIONERS, 1851 TO 1888			
Dredging Montreal to Cap à la Roche to 27½ feet at O.L.W. and from Cap à la Roche to Quebec to 27½ feet at half tide.....	3,402,494 35	534,809 65	19,865,693
DEPARTMENT OF PUBLIC WORKS			
Dredging consisting of widening and cleaning up of channel, deepening Cap à la Roche to Cap Charles to 27½ feet at O.L.W. and dredging at Grondines, Lotbiniere and Ste. Croix, 1889 to June 30, 1899.....	839,583 08	486,971 79	3,558,733
PROJECT OF 1899			
Dredging channel between Montreal and Quebec to 30 feet at lowest water of 1897, also widening to a minimum width of 450 feet and straightening—			
Fiscal year 1899-1900.....	100,191 91	265,270 78	1,107,894
“ 1900-1901.....	136,680 83	287,040 04	2,479,385
“ 1901-1902.....	185,429 80	479,731 47	3,098,350
“ 1902-1903.....	255,776 55	277,703 50	6,544,605
“ 1903-1904.....	276,958 59	308,765 44	4,619,260
DEPARTMENT OF MARINE AND FISHERIES			
<i>This includes the work below Quebec</i>			
Fiscal year 1904-1905.....	311,087 93	277,225 69	2,716,220
“ 1905-1906.....	431,768 30	317,327 37	4,047,530
“ 1906-1907 (July 1, 1906, to March 31, 1907).....	302,677 37	275,003 61	3,001,010
“ 1907-1908.....	478,209 66	417,390 22	4,831,875
“ 1908-1909.....	497,686 03	340,861 86	5,896,737
“ 1909-1910.....	572,950 71	321,375 80	6,354,285
“ 1910-1911.....	576,838 02	488,248 88	5,600,050
“ 1911-1912.....	588,697 60	499,799 58	4,509,904
“ 1912-1913.....	663,229 74	430,107 86	6,929,344
“ 1913-1914.....	895,235 59	426,018 12	6,140,867
“ 1914-1915.....	1,036,846 65	327,975 71	6,225,143
“ 1915-1916.....	976,622 03	771,760 03	8,462,957
“ 1916-1917.....	1,030,550 60	437,469 62	7,800,555
“ 1917-1918.....	618,399 69	136,765 97	2,517,376
“ 1918-1919.....	350,152 92	79,797 45	628,060
“ 1919-1920.....	422,107 05	132,747 20	517,305
“ 1920-1921.....	446,134 85	151,422 99	715,895
“ 1921-1922.....	464,660 74	102,710 14	1,167,100
“ 1922-1923.....	465,236 80	261,152 89	793,350
	16,326,206 49	8,835,453 16	120,129,483

PROGRESS of Dredging Operations at Date of Writing, the Close of the
Season 1922

THIRTY-FOOT PROJECT

Locality	Distance English miles	Total length requiring dredging	Length dredged in 1922	Total length of 30-foot channel dredged	Length yet to be dredged
	Miles	Miles	Miles	Miles	Miles
Division No. 1— Montreal to Sorel.....	45	22.90	.....	22.90	All completed
Division No. 2— Sorel to Batiscan.....	36	12.45	.....	12.45	All completed
Division No. 3— Lake St. Peter.....	20	18.00	.....	* 0.50 †17.50	
Division No. 4— Batiscan to Quebec.....	59	10.00	0.04	8.61	1.44
Division No. 5— Quebec to the Traverse.....	60	4.65	4.65	
Totals.....	220	68.00	0.04	66.61	1.44

*Not widened.

†Widened.

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PROGRESS of Dredging Operations at Date of Writing, the Close of the Season
1922, thirty-foot project.

Locality	Length of dredging		Cubic yards yet required to be done
	Required	Done	
	Miles	Miles	
Division No. 1—			
Longueuil Shoal.....		1.10	
Longue Pte. to Pte. aux Trembles (E.H.).....		5.05	
Ile Ste. Therese.....		0.40	
Varennas to Cap St. Michel.....		3.00	
Cap St. Michel to Vercheres.....		4.50	
Vercheres Traverse.....		1.10	
Vercheres to Contrecoeur.....		1.70	
Contrecoeur Channel.....		6.05	
Total.....		22.90	
Division No. 2—			
Sorel to Ile de Grace.....		4.40	
Stone Island.....		1.10	
Ile aux Raisins.....		0.25	
Lake St. Peter (See Div. 3).....			
Port St. Francis.....		0.50	
Three Rivers.....		0.50	
Cap Madeleine to Becancour.....		1.55	
Becancour to Champlain.....		2.25	
Champlain to Pte. Citrouille.....		1.30	
Batture Perron.....		0.60	
Total.....		12.45	
Division No. 3—			
Lake St. Peter.....		* 0.50	200,000
		†17.50	
Total.....		18.00	200,000
Division No. 4—			
Batiscan to Cap Levrard.....		3.00	
Cap à la Roche Channel.....	0.24	1.81	165,005
Pouillier Rayer.....		1.20	
Cap Charles.....		0.90	
Grondines.....		0.80	
Lotbiniere.....		0.40	
Cap Santé.....		0.20	
Ste. Croix.....	0.60	0.30	300,000
St. Augustin.....	0.60		500,000
Total.....	1.44	8.61	965,005
Division No. 5—			
Quebec to the Traverse.....		4.65	550,000
Total.....		4.65	550,000
Totals.....	1.44	66.61	1,715,005

*Not widened.

†Widened.

THIRTY-FIVE FOOT PROJECT

Locality	Distance English miles	Total length requiring dredging	Length dredged in 1922	Total length of 35 foot channel dredged	Length yet to be dredged
	Miles	Miles	Miles	Miles	Miles
Division No. 1— Montreal to Sorel.....	45	27.24	0.46	17.76	9.48
Division No. 2— Sorel to Batiscan.....	36	19.75	0.12	6.34	13.41
Division No. 3— Lake St. Peter.....	20	18.32	.....	17.16	1.16
Division No. 4— Batiscan to Quebec.....	59	15.54	.....	.....	15.54
Division No. 5— Quebec to Goose Cape (north chan- nel).....	66	8.14	0.75	7.39
Total.....	226	88.99	0.58	42.01	46.98

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PROGRESS of Dredging Operations at Date of Writing, the Close of the Season
1922, thirty-five foot project.

Locality	Length of Dredging in miles		Cubic yards Yet to be dredged	Cubic yards dredged
	Yet to be done	done		
<i>Division 1—</i>				
Longueuil shoal.....	1.88		517,959	203,495
Longue Pointe Traverse.....	0.39	0.08	443,592	51,550
Longue Pointe Curve.....	1.24	0.08	991,531	242,350
Pointe aux Trembles Channel.....	0.05	3.02	53,625	1,223,475
Ile Ste. Therese Channel.....	1.12		146,611	
Varennas Curve.....	0.45	1.69	593,546	2,297,060
Cap St. Michel Crue.....	1.00		500,500	
Cap St. Michel to Vercheres.....	0.25	4.47	177,139	1,913,350
Vercheres Traverse.....	0.25	0.47	92,763	193,625
Vercheres to Contrecoeur.....		1.91		1,157,700
Contrecoeur channel.....	2.24	6.04	1,960,282	3,652,593
Lanoraie to Sorel.....	0.61		159,215	
Totals Division 1.....	9.48	17.76	5,636,763	10,935,198
<i>Division 2—</i>				
Sorel to Ile de Grace.....	0.76	4.22	748,006	2,962,054
Stone Island.....	1.42	0.69	466,370	414,890
Ile aux Raisins.....	0.99	1.10	202,125	777,224
Port St. Francis.....	0.67	0.33	491,303	248,275
Three Rivers.....	0.72		533,192	
Cap Madeleine to Becancour.....	2.40		1,348,578	
Becancour to Champlain.....	1.16		932,750	
Champlain to Pointe Citrouille.....	4.06		2,632,356	
Batture Perron.....	1.23		684,600	
Totals, Division 2.....	13.41	6.34	8,039,280	4,402,443
<i>Division 3—</i>				
Lake St. Peter.....	1.16	17.16	1,161,570	11,335,582
Totals, Division 3.....	1.16	17.16	1,161,570	11,335,582
<i>Division 4—</i>				
Batiscan to Cap Levrard.....	4.48		2,386,168	
Cap Levrard.....	1.27		781,666	
Cap a la Roche Curve.....	2.06		1,836,859	
Cap Charles channel.....	2.04		1,077,416	
Grondines.....	0.83		513,332	
Lotbiniere.....	0.47		321,480	
Cap Santé.....	1.51		655,561	
St. Croix.....	1.47		798,518	
St. Augustine.....	1.41		826,207	
Totals, Division 4.....	15.54		9,197,207	
<i>Division 5—</i>				
Quebec to Goose Cape (North channel).....	2.84		2,585,132	
Madame Reef shoal (West Sand and East Narrows shoal).....	4.55	0.75	364,838	13,203,203
Totals, Division 5.....	7.39	0.75	2,949,970	13,203,203
Totals.....	46.98	42.01	26,984,790	39,876,426

ABSTRACT of Work of Dredging Fleet during Fiscal Year.

Dredge	Locality of Dredging	Time of service Days	Working hours, 10 per day	Hours actual dredging	No. of Scows filled	Cubic yards dredged (Scow meas.)	Depth of dredging at L.W.	Width in feet	Character of Soil	Remarks
Dredge No. 1	Contrecoeur Channel.	48	480	331½	189	47,750	35	350	Clay	Capt. Octave Matte. Channel and widening.
	Cap a la Roche	88	880	508½	230	49,400	30	300	Shale rock boulders.	
	Total	136	1,360	840½	419	97,150				
Dredge No. 4	Contrecoeur Channel.	28	280	222½	122	30,500	35	300	Clay	Capt. Maxime Pelouquin. Cleaning up.
	Ste. Anne Curve	20	200	141½	105	28,200	35	400	Clay.	
	Champlain Channel.	91	910	701½	398	99,750	30	225	Sand	
	Total	139	1,390	1,066½	625	158,450				
Dredge No. 12	Vercheres Contrecoeur Channel	54	540	422½	603	150,750	35	225	Clay and stones	Capt. Jean Bilodeau.
	Total	54	540	422½	603	150,750				
Dredge No. 13	Vercheres Contrecoeur Channel	62	620	532½	644	161,000	35	225	Clay, stones, boulders.	Capt. L. St. Germaine
	Ste. Anne Curve	31	310	278½	380	95,000	35	400	Clay.	
	Total	93	930	811½	1,024	256,000				
				Hopper	Barges					
Dredge No. 16	North Channel, E. Narrows	44	474	356½	171	89,975	35	1,000	Sand, gravel, clay and stones.	Capt. A. Bourget.
	Quebec Harbour	24	264	146½	78½	41,025	35	270		
	Total	68	738	503	249½	131,000				

Total cubic yards dredged, 793,350.

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CLASSIFICATION of Disbursements for Fiscal Year ended March 31, 1923.

Vessels	Fuel	Wages	Board	Stores and materials	Repairs and labour	Expenditure New plant	Proportion of general and office expenses, etc.	Expenditure for each vessel	Rock cutter and stone lifter service of dredges	Tug service	Inspection and sweeping service	Total cost of operations of each dredge and plant during fiscal year	Total expenditure on different appropriations
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Elevator Dredge No. 1.....	6,598 89	10,558 33	3,248 16	2,011 32	11,195 63	.....	6,524 92	40,132 25	6,874 96	.....	7,906 18	83,547 13	.....
Tug <i>Varennes</i>	4,565 16	6,923 21	2,405 16	1,475 79	7,891 73	.....	5,372 69	28,633 74	.....	28,633 74	.....	.....	.....
Elevator Dredge No. 4.....	4,342 69	10,560 77	3,312 52	1,509 79	6,183 71	.....	5,667 66	31,577 14	6,874 96	.....	7,906 18	67,415 50	.....
Tug <i>Lavaltrie</i>	3,601 99	5,786 74	1,969 02	761 63	4,348 36	.....	4,616 48	21,057 22	.....	21,057 22	.....	.....	.....
Elevator Dredge No. 12.....	12,745 17	9,531 91	1,640 76	2,006 34	13,275 90	.....	7,147 79	46,347 87	6,874 95	.....	7,906 17	84,323 46	.....
Tug <i>Lac St. Pierre</i>	3,644 25	6,917 48	1,914 82	1,671 80	4,218 48	.....	4,827 64	23,194 47	.....	23,194 47	.....	.....	.....
Elevator Dredge No. 13.....	6,041 99	9,352 59	2,943 46	2,090 06	33,148 97	.....	8,748 90	62,325 97	6,874 95	.....	7,906 17	100,556 72	.....
Tug <i>James Houden</i>	3,528 01	6,243 68	2,018 13	1,267 76	5,538 84	.....	4,853 21	23,449 63	.....	23,449 63	.....	.....	.....
Elevator Dredge No. 16.....	7,272 77	18,749 37	4,957 33	2,538 49	6,874 23	.....	7,280 54	47,672 73	.....	.....	7,601 99	129,363 99	.....
Hopper Barge No. 1.....	3,753 02	7,755 35	1,788 79	2,877 32	13,796 07	.....	6,119 90	36,090 45	.....	36,090 45	.....	.....	.....
Hopper Barge No. 2.....	5,525 75	8,146 23	2,186 03	2,548 81	13,280 57	.....	6,311 13	37,998 82	.....	37,998 82	.....	.....	.....
Str. <i>Detector</i> , divided equally between the dredges.....	6,224 88	12,957 20	4,746 64	2,685 72	5,443 29	.....	6,312 25	38,009 98	.....	.....	.....	.....	.....
Rock Breaker No. 1, divided equally between dredges 1, 4, 12, 13.....	2,369 42	6,424 52	1,926 40	1,335 83	3,551 68	.....	4,520 37	20,128 22	.....	.....	.....	.....	.....
Stone Lifter No. 5.....	518 85	2,665 87	790 40	372 49	2,285 30	.....	738 69	7,371 60	.....	.....	.....	.....	.....
Sounding scow, divided equally between dredges 1, 4, 12, 13.....	.....	.....	.....	.....	1,094 79	.....	121 92	1,216 71	.....	.....	.....	.....	.....
	70,727 81	122,213 25	35,847 62	25,156 15	132,127 85	.....	79,164 09	465,236 80	27,499 82	170,454 33	39,226	69465,236 80	.....

Details of Dredging Locality and Cost per Cubic Yard

Dredge	Total cost of operations of each dredge and plant during fiscal year	Number of days in operation each dredge	Cost per day operating dredges and plant	Days working each locality	Cost of work each locality	Total Cost of operations of each dredge	Number of cubic yards dredged in each locality	Total cubic yards for each dredge	Cost per cubic yard each locality	Average cost per cubic yard for each dredge	Kind of material dredged	Locality of dredging
Elevator Dredge No. 1...	\$ cts. 83,547 13	136	\$ cts. 614 32	48	\$ cts. 29,487 23	83,547 13	\$ cts. 47,750		\$ ·6173/100		Clay.....	Bellmouth Curve (Contrecoeur channel).
Elevator Dredge No. 4...	67,445 50	139	485 22	88	51,059 90	83,547 13	49,400	97,150	1·0043/100	·8603/100	Shale, rock and boulders	Cap a la Roche Curve.
Elevator Dredge No. 12...	84,323 46	54	1,561 54	20 91	9,704 38 44,154 98	67,445 50	28,200 99,750		·3441/100 ·4427/100		Clay..... Sand.....	Ste-Anne Curve. (Hamplain cleaning up (Contrecoeur channel).
Elevator Dredge No. 13...	100,556 72	93	1,081 26	28	13,586 14	67,445 50	30,500	158,450	·4464/100	·4257/100	Clay.....	Contrecoeur Traverse.
Elevator Dredge No. 16...	129,363 90	68	1,902 41	12 42	18,738 55 65,584 91	84,323 46	23,750 127,000		·7800/100 ·5164/100		Clay and stones..... Clay, stones and boulders.	Vercheres, Contrecoeur Channel. Vercheres, Contrecoeur Chan. (Ile au Boeuf).
				31 62	33,518 90 67,037 82	100,556 71	95,000 161,000		·3528/100 ·4164/100		Clay..... Clay, stones and boulders.	Ste-Anne Curve. Vercheres, Contrecoeur Chan. (Ile au Boeuf).
				44 24	83,706 11 45,657 88	129,363 99	89,975 41,025		·9303/100 1·1129/100		Sand, gravel, clay, and stones. Sand, gravel, clay, and stone.	North Channel, East Narrows. Quebec Harbour.
	465,236 80	490	490	465,236 80	465,236 80	793,350	793,350				

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SOREL SHIPYARD

REPORT OF SUPERINTENDENT, LOUIS LACOUTRE

New Construction.—No new vessels were built at the Shipyard during the fiscal year 1922-23.

Dominion Steamers.—Repairs were made during the year to the Dominion steamers *Lady Grey*, *Rouville*, *Reserve*, *Vercheres*, *Shamrock*, *Argenteuil*, *Bellechasse*, and *Berthier*.

Shipyard Buildings.—All buildings were repaired when necessary, and kept in good condition.

Hauling Ways.—Were reinforced and repaired, and two side ways were permanently installed.

Sheer Legs.—The 140 tons sheer-legs were maintained in good operating condition.

Besides performing shipyard work they were utilized by the following private firms: The Transportation and Shipping Co., and Canadian Vickers, Ltd.

General.—All dredges, barges, scows, tugs, stonelifters, etc., employed in the work of the St. Lawrence Ship channel were kept in good condition.

The force employed during the year varied from 244 to 554 hands.

EXPENDITURE AND REVENUE

STATEMENT of Expenditure, Marine Department, 1922-23

Service	Appropriation	Expenditure	Balance
	\$ cts.	\$ cts.	\$ cts.
Ocean and River Service—			
Dominion steamers.....	1,600,000 00	1,367,420 18	232,579 82
Examination masters and mates.....	20,000 00	18,308 38	1,691 62
Life saving service.....	90,000 00	60,689 63	29,310 37
Investigation into wrecks.....	12,300 00	5,278 61	7,021 39
Schools of navigation.....	8,000 00	6,920 56	1,079 44
Registration of shipping.....	5,000 00	1,537 14	3,462 86
Removal of obstructions.....	5,000 00	4,998 02	1 98
Allowance to relatives of crew of <i>Lambton</i>	30,500 00	30,500 00	
Cattle inspection.....	3,000 00	2,993 21	6 79
Subsidy to wrecking plants.....	35,000 00	35,000 00	
Unforeseen expenses.....	5,000 00	3,922 16	1,077 84
Distressed seamen.....	9,150 00	7,337 51	1,812 49
Boat to replace <i>Lambton</i>	100,000 00	80,000 00	20,000 00
Allowance to A. Barton.....	500 00	500 00	
Allowance, Captain Murphy.....	2,201 70	2,201 70	
Total.....	1,925,651 70	1,627,607 10	298,044 60
Public Works (Capital)—			
Sorel Shipyard.....	90,000 00	89,321 60	678 40
Ship channel.....	693,000 00	658,933 72	34,066 28
Sea going elevator dredge.....	90,055 00	89,855 00	200 00
Self propelling hopper barge.....	285,000 00	226,469 21	58,530 79
Total.....	1,158,055 00	1,064,579 53	93,475 47
Lighthouse and Coast Service—			
Agency rents and contingencies.....	210,000 00	190,418 69	19,581 31
Salaries of lightkeepers.....	650,000 00	649,856 09	143 91
Maintenance of lights.....	850,000 00	790,893 93	59,106 07
Construction of lights.....	400,000 00	397,432 68	2,567 32
Signal service.....	89,000 00	86,067 82	2,932 18
Administration of pilotage.....	344,000 00	109,003 67	234,996 33
Repairs to wharves.....	10,000 00	8,458 04	1,541 96
Icebreaking.....	40,000 00	40,000 00	
Pensions to retired pilots.....	8,700 00	8,400 00	300 00
Allowance Harbour master, Amherstburg.....	1,200 00	1,200 00	
Allowance J. Davidson.....	500 00	500 00	
To complete delivery of steel plates.....	35,000 00	24,253 70	10,746 30
Total.....	2,638,400 00	2,306,484 62	331,915 38

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STATEMENT of Expenditure, Marine Department, 1922-23—*Concluded*

Service	Appropriation	Expenditure	Balance
	\$ cts.	\$ cts.	\$ cts.
Scientific Institutions—			
Meteorological service.....	262,000 00	251,583 00	10,417 00
Naval Service—			
Radiotelegraph Service.....	440,400 00	358,267 70	82,132 30
Hydrographic Survey.....	350,000 00	302,063 92	47,936 08
Tidal Service.....	30,000 00	29,992 24	7 76
Patrol of the Northern Waters.....	15,000 00	9,001 14	5,998 86
	385,400 00	699,325 00	136,075 00
Steamship Inspection—			
Steamship inspection.....	114,810 00	110,457 97	4,352 03
Civil Government—			
Salaries.....	393,580 00	385,248 88	8,331 12
Contingencies.....	67,500 00	66,916 79	583 21
Total.....	461,080 00	452,165 67	8,914 33
Miscellaneous—			
Cost of Living bonus.....		177,354 80	
Gratuities.....		4,906 31	
Classification arrears.....		1,200 01	
Prince Rupert Dry Dock claims.....	130,000 00	65,660 03	64,339 97
C.P.R. bridge at False Creek.....	40,934 08	40,934 08	
Legal expenses re steel plates.....	8,200 00	8,187 37	12 63
Legal expenses, E. Lafleur.....	1,400 00	1,400 00	
Toronto city tax on shipyards.....	18,017 76	18,017 76	
Total.....	198,551 84	134,199 24	64,352 60
Superannuation No. 4.....		8,353 92	
Montreal Harbour Commission.....		1,802,000 00	
Quebec “ “.....		284,200 00	
Vancouver “ “.....		2,289,000 00	
Imperial Government.....		430,043 05	
Victoria (B.C.) shipowners.....		5,157 08	
Consolidated revenue.....		1,501,273 46	
Unforeseen expense (Finance).....		6,291 00	

RECAPITULATION OF SERVICES

	\$ c.	\$ c.	\$ c.
Ocean and River Service.....	1,925,651 70	1,627,607 10	298,044 60
Public Works (Capital).....	1,158,055 00	1,064,579 53	93,475 47
Lighthouse and Coast.....	2,638,400 00	2,306,484 62	331,915 38
Scientific Institutions.....	262,000 00	251,583 00	10,417 00
Steamboat Inspection.....	114,810 00	110,457 97	4,352 03
Naval Service.....	835,400 00	699,325 00	136,075 00
Civil Government.....	461,080 00	452,165 67	8,914 33
Miscellaneous (Marine).....	198,551 84	134,199 24	64,352 60
	7,593,948 54	6,646,402 13	947,546 41
Miscellaneous, Finance Department.....		6,509,779 63	
		13,156,181 76	

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STATEMENT of Revenue for Fiscal Year 1922-23

	Gross	Refunds	Net
	\$ c.	\$ c.	\$ c.
Harbour dues.....	861 50		861 50
Piers and wharves.....	93,074 89	581 51	92,493 38
Dominion steamers.....	854 30		854 30
Masters and mates.....	4,003 25	5 00	3,998 25
Steamboat Inspection—			
Engineers' fees.....	\$ 1,388 00		
Incidental.....	15,547 95		
Annual fees.....	109,061 00		
	125,996 95	266 00	125,730 95
Decayed Pilots fund.....	10,618 52		10,618 52
Casual revenue.....	79,248 24	816 01	78,432 23
Fines and forfeitures.....	2,246 87		2,246 87
Signal station service.....	706 00		706 00
Marine registers.....	45 19		45 19
St. John Pilotage fund.....	55,485 50		55,485 50
Halifax Pilotage fund.....	62,204 70		62,204 70
Halifax pilots superannuation fund.....	3,110 24		3,110 24
Sydney pilots superannuation fund.....	6,744 73		6,744 73
St. John pilots superannuation fund.....	6,658 26		6,658 26
Sydney pilotage fund.....	44,964 89		44,964 89
Radio revenue.....	38,930 44	6 15	38,924 29
W A Licenses fees.....	16,223 20	6 00	16,217 20
W O Examination fees.....	245 00		245 00
Premium, discount and exchange.....	92 79		92 79
Pilots license fees.....	75 00		75 00
Retirement fund.....	1,090 97		1,090 97
Capital Account—			
Shipbuilding.....	\$ 20,777 85		
New icebreaker.....	1,730 57		
Sorel shipyard.....	258 13		
	22,766 55		22,766 55
Total.....	576,247 98	1,680 67	574,567 31

METEOROLOGICAL SERVICE

REPORT OF SIR FREDERICK STUPART, DIRECTOR

In last year's report the ordinary activities of the service were so fully described, that it is assumed that a brief statement of change during the past year will meet the requirements of this report.

The full complement of the Central office staff is 37, all of whom devote their whole time to the service. At the close of the year there were 686 stations furnishing reports to the Central office, being an increase of 40 over last year. At 316 of these stations the observer is paid a salary for duties performed, but it is only at Victoria, Vancouver, Edmonton, Moosejaw, Winnipeg, Quebec and St. John that the observers are paid for whole time work, and in most instances the stipend is very small. There are five employees at Victoria, three at St. John, and two at both Halifax and Winnipeg. At all other stations there is but one observer. At 360 stations the observing is performed voluntarily by men who take an interest in weather records and this makes a valuable contribution to the country.

The Central office has within the past year lost several of its oldest members.

Mr. William Menzies who for a long term of years was Chief Magnetic Observer, was retired April 1, 1922.

Mr. F. Payne, the Secretary of the service, was retired November 1, 1922.

Mr. J. G. Sharp, M.A., Forecaster, resigned November 1, 1922.

Mr. F. L. Blake, D.L.S., Astronomer, was retired at the close of the year. Only one of the vacant positions has yet been filled and the service has in consequence been somewhat handicapped through lack of experienced workers.

The percentage of verification of the forecasts for the year was 84.9, and of the storm warnings, 88.5.

As for many years past weather forecasts and storm warnings for Newfoundland have been issued from the Central Meteorological Office, Toronto, and at the request of the Minister of Marine of that country the telegraph reporting stations at St. Johns, Port Aux Basques, Fogo, and Burin were inspected by Mr. J. G. Sharp, of the Central office, Toronto.

The Dominion maintains a station at Cape Race to which point bi-daily weather bulletins are telegraphed, that they may be broadcasted for the benefit of ships on the near Atlantic. Mr. Sharp reported as follows:—

“The work of broadcasting weather information and forecasts from Cape Race has grown enormously; in fact it is now a service of first importance to Canadian and International shipping in touch with Cape Race. Mr. Kerton, the Manager of the Cape Race Wireless Station, said he could not express too strongly his appreciation and admiration of the forecasts sent down from our office. He said he would like just to show us the value of the work, to have us discontinue the Service for even two weeks; there would be such an outcry from shipping of all nations that we would be in no doubt as to the esteem in which the forecasts are held. The work of sending out forecasts on request has grown to such a volume that if we were paying for it at the ordinary commercial rate it would cost us one hundred thousand dollars per year; in fact such requests are so numerous that they are interfering with the commercial work of the Marconi Company and the Government will be asked for some relief in this connection.”

Publications.—Each day about 400 printed weather maps have been distributed to Government offices, commercial houses and schools. On or about the 5th of each month 654 copies of a map showing the conditions which prevailed in the Dominion during the month just closed, were distributed chiefly to observers and agricultural farms and colleges. The “Monthly Record of Meteorological Observations,” which is the official record of the weather in Canada, has been distributed to 654 institutions and persons, as soon as received from the King’s Printer. Copies of “The Toronto Year Book” for 1921 to the number of 193 were distributed, as were also 92 copies of the Magnetic Report for 1919.

DIVISION OF CLIMATOLOGY AND AGRICULTURAL METEOROLOGY

During the year the reports of daily observations from more than 650 stations have been summarized and published. Some thirty sets of hourly observations have been measured from the autographic instruments, making some quarter of a million hourly readings which have been used to compute the average hourly values for each station and most of which have been published.

The Monthly Weather Map, which in former years was prepared and issued by the Forecast Division with the assistance of this division, has during the year been taken over entirely. Telegraphic despatches from over the whole Dominion and all mailed reports from Manitoba, Ontario, and Quebec which can reach us by the 4th or 5th of the month are utilized to bring out about the

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7th of each month a summary of the condition of crops, the progress of agricultural operations, and a graphical survey of the weather of the month just closed.

The gathering and compilation of phenological observations in Canada which was formerly done by Mr. F. F. Payne, the now retired Secretary of the Meteorological Service, has also been added to the duties of this division. A summary for the year 1922 including the data gathered in the schools of Nova Scotia by Dr. A. H. MacKay, has been prepared for publication. Another system of gathering this data so as to make it more useful in agricultural meteorology is being worked out.

Numerous special inquiries from the legal, medical, and engineering professions, from claims agents, manufacturers' agents, intending settlers, and others, have been answered during the year by furnishing copies of data, by special computations, or by reference to our library of climatological publications of other countries. Special tables, maps, or short articles, have been furnished to other departments of the Dominion Government or to provincial departments.

All available time not taken up by the routine work has been spent upon the preparation of a report on the temperature, precipitation, humidity and sunshine of Eastern Canada during the last forty years, and upon research in agricultural meteorology. Endeavour has been made to adopt the mathematical methods of Bjerknes and of Richardson in daily forecasting, to the more general problem of computing the total effect upon a crop of the various weather changes throughout the season. The Dominion Bureau of Statistics and the Experimental Farms have continued to assist us by gathering special crop data during last season.

By a new system of preparing wind data, found advisable for work in agricultural meteorology, complete tables of wind velocity and direction for every hour throughout the year at over fifty points in Canada and Newfoundland, or approximately half a million readings annually, are now made with the assistance of our observers. These are afterwards reduced by a tedious process, and another calculating machine is found necessary by this division to take care of this and the new work we have undertaken during the year just closed.

ATMOSPHERIC PHYSICS

Pilot balloons to determine the direction and velocity of the wind at all heights up to which the balloons can be observed were sent up throughout the year on all days the weather permitted at Toronto, Ont., and Victoria, B.C., and at all the Air Board stations during the flying season. Pilot balloons were also used during the artillery practice at Petawawa camp.

Balloons carrying meteorographs to register the pressure and temperature in the upper air were sent up on the international days from Woodstock, Ont., and Calgary, Alta., and about half of the instruments have been recovered. The greatest height reached was only 9.7 miles at Calgary on the 18th May; at this height the temperature was 78° F. below zero. The lowest temperature recorded in the balloon flights from Woodstock was 81° F. below zero at a height of 7 miles on the 14th May. The meteorographs have been considerably modified and improved during the year by substituting for the temperature element a small thermometer of thermostatic metal, which gives a greater movement of the temperature pen.

Mr. Harold Bibby, who spent the year from July, 1921, to July, 1922, at Fort Good Hope taking meteorological and magnetic observations, as the Canadian contribution to the work of the Amundsen expedition, inspected on his

return trip the meteorological stations on the MacKenzie river and took magnetic observations at various places along the river. At Fort Good Hope, with the assistance of the priests, he sent up 312 pilot balloons, and on one occasion followed the balloon for 130 minutes to a height of nearly 13 miles. This is one of the longest flights on record. When he left the station the pilot balloon work was continued by the priests. In the magnetic work he took one observation per week of horizontal force and four a week of declination and dip, while on three days per month hourly observations on the two latter were taken for twenty-four hours. In addition Mr. Bibby obtained some excellent sketches of the Aurora, parhelia and carona.

The defects that developed during the first trials in the thermograph and the resistance thermometer for taking accurate measurements on board ship of the temperature of ocean water were remedied and the thermometers installed on two of the Pacific ships. The sea water temperatures as recorded on board ship are being collected and the monthly mean obtained for every 5 squares.

Earth temperature resistance thermometers have been installed at Toronto at the following depths: Surface, 4 inches, 10 inches, 20 inches, 40 inches, 9 feet and 15 feet. The first five are recorded automatically and are so arranged that an absolute measure of the temperature can also be taken occasionally to check the automatic readings. The lower three are read once daily.

A standard evaporation tank was installed at the School of Agriculture at Olds, Alta.

The theory of the anemometer has been worked out from the results of the investigation that was made on the anemometer in the wind tunnel of the University of Toronto, and it has been shown that a three-cup anemometer is better than one with four. The United States Weather Bureau has also been experimenting on the anemometer and the two services are co-operating in designing a new instrument which, it is hoped, will give results closely approximating to the true wind velocity.

MAGNETIC OBSERVATIONS

Continuous photographic records of the magnetic elements were obtained at Agincourt without material loss. Pronounced magnetic disturbances were of infrequent occurrence as expected during the minimum sunspot period. The more important disturbances were registered on April 26, 27 and September 14 of 1922 and March 24, 1923.

Absolute observations of declination and horizontal force were made weekly and of inclination twice weekly and from the results of these observations, control of the base values of the photographic records was maintained.

Tables showing the magnetic character of each day of the year in Greenwich time were prepared and forwarded to the International Commission on Terrestrial Magnetism. The "selected days" of the commission are used in the analysis of magnetic data for our annual magnetic report.

At the request of the Surveyor-General index corrections for compasses attached to forty-one surveyor's theodolites were determined and the results forwarded. Assistance was given to members of his staff in determining constants for their total force instruments both before and after their summer field work.

Assistance also was given to Messrs. French and Madill of the Dominion Observatory staff, in standardizing their magnetometers before and after their summer field work.

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During the summer, intercomparisons were made between the Agincourt and Meanook Observatory instruments with the aid of Meteorological Service Magnetometer No. 15, the results of which will be published in the Annual Magnetic Report.

An earth inductor, the product of our own workshop, was installed at Meanook as the standard for inclination observations, and much greater accuracy is now being secured in measuring this element.

There has been considerable loss of record at Meanook during the winter months, owing to stoppage of the driving mechanism during extreme cold.

Weekly observations of declination and inclination were made at Meanook throughout the year and twice monthly observations of horizontal force.

The accompanying tables give a summary of the results obtained at Agincourt and Meanook during the fiscal year 1922-23. All results are reduced to international magnetic standard.

SUMMARY of Results of Observations made at Agincourt

Month	Mean Monthly Values					
	D West		H	Z	I	
	°	'	γ	γ	°	'
1922						
April.....	6	55.2	15816	57990	74	44.7
May.....		55.6	816	972		44.4
June.....		55.6	820	966		44.1
July.....		56.1	813	953		44.3
August.....		56.7	806	932		44.3
September.....		57.2	798	932		44.8
October.....		58.1	794	927		44.9
November.....		58.2	800	929		44.6
December.....		58.5	801	916		44.4
1923						
January.....		58.6	798	898		44.3
February.....		59.3	793	894		44.5
March.....		60.0	790	887		44.5

AGINCOURT Daily and Monthly Ranges

Month	D			H			Z		
	Mean Daily Range		Absolute Monthly Range	Mean Daily Range		Absolute Monthly Range	Mean Daily Range		Absolute Monthly Range
	From hourly readings	From Max. and Min.		From hourly readings	From Max. and Min.		From hourly readings	From Max. and Min.	
1922			°	γ	γ	γ	γ	γ	γ
April ..	10.9	26.4	1 13.1	33	92	514	32	68	422
May.....	11.8	20.8	1 11.6	39	85	305	20	55	302
June.....	11.6	21.2	0 51.7	36	77	202	18	46	170
July.....	12.2	21.7	0 59.9	44	85	260	24	52	250
August.....	12.5	23.4	0 57.7	40	76	158	20	49	132
September.....	9.8	22.6	0 59.0	41	80	381	25	59	442
October.....	6.7	20.1	1 06.7	30	65	271	15	44	262
November.....	6.4	14.6	0 53.3	22	47	130	4	15	67
December.....	4.9	10.0	0 29.0	17	35	99	3	8	63
1923									
January.....	7.4	12.2	0 34.5	27	43	75	3	9	29
February.....	6.8	14.7	1 08.1	21	47	158	7	18	155
March.....	8.9	16.5	1 48.8	30	68	575	7	25	376

SUMMARY of Results of Magnetic Observations made at Meanook

Month	Mean Monthly Values			
	D East	H	Z	I
	° ' "	γ	γ	° ' "
1922				
April.....	27 27.4	12910	60220	77 54.0
May.....	26.9	12897	60142	53.8
June.....	28.1	12905	60162	53.6
July.....	28.3	12921	60160	52.7
August.....	28.9	12909	60130	53.0
September.....	29.1	12896	60146	53.9
October.....	28.2	12862	59996	54.0
November.....	26.9	12907	60189	53.8
December.....	25.5	12899	60117	53.4
1923				
January.....	26.3	12896	60120	53.6
February.....	25.9			53.3
March.....				

MEANOOK Daily and Monthly Ranges of D

Month	Diurnal Range		Absolute monthly range
	From hourly readings	From Max. and Min.	
1922			° ' "
April.....	11.8	50.8	2 53.6
May.....	13.9	33.4	1 35.2
June.....	14.6	33.4	2 08.4
July.....	13.9	37.7	2 13.5
August.....	14.8	44.9	2 57.4
September.....	15.4	50.2	3 59.4
October.....	9.4	42.3	3 56.9
November.....	5.3	19.8	1 07.6
December.....	4.2	18.9	1 07.8
1923			
January.....	6.3	19.2	1 16.0
February.....	5.8	24.9	2 12.7
March.....			

TIME SERVICE

Eighty-six determinations for time have been made by transit of stars in the meridian with the 3-inch Troughton and Simms transit instrument.

The positions of the stars have been mostly from those in the American Ephemeris and the British Nautical Almanac. The collimation error of the transit instrument, has been determined frequently by the methods used during former years.

Time has been given over the telegraph and telephone lines to all inquirers, and the comparison and regulation of chronometers and watches, both sidereal and mean, has been carried on throughout the year. The performance of the clocks has been satisfactory.

The usual 11.55 a.m. signal on the fire-alarm system has been continued throughout the year.

Time has been given weekly to the magnetic observatory at Agincourt, and also daily to the Canadian National Railway.

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The time exchanges between Toronto and Quebec, Montreal and St. John, N.B., have been made as usual, being recorded on the chronographs at Toronto, Montreal and St. John.

The errors of the clocks have been computed from the latest observations.

The following table will show the differences between the time at the several observatories and that at Toronto. The sign + indicates slow of Toronto:—

1922	Montreal	Quebec	St. John, N.B.
	Seconds	Seconds	Seconds
April 21.....	-1.84	+0.58	-1.14
May 12.....	-0.68	+0.78	-0.49
June 23.....	+0.36	+1.06	-0.44
July 14.....	-0.17	+1.03	-0.71
July 28.....	-0.66	+0.21	-1.00
August 25.....	+0.82	-0.10	+0.21
September 22.....		+0.41	*
October 6.....	+0.68	+0.60	-1.26
November 10.....	+0.03	+1.33	*
November 24.....	-0.37	-0.17	-0.38
December 15.....	+0.24	+0.30	+0.40
1923			
January 19.....	-0.41	+0.46	-0.66
February 9.....	*	-0.63	-0.50
February 23.....	+0.01	-0.53	-1.01

* Wire trouble.

During the year ending December 31, 1922, the sun was observed on 147 days and on 58 of these it was free of spots.

Maps were made using the 6-inch equatorial telescope with a power of 50, the projected image being 5 inches in diameter. The positions of the N.S. and E.W. points together with the sun's axis and equator being drawn on the disc together with the spots and faculæ.

The mean sunspot relative numbers for the months of the civil year ending December 31, 1922, were as follows:—

January, 10.8; February, 32.9; March, 58.3; April, 15.2; May, 7.1; June, 0.0 (Observations taken on 7 days only beginning June 22 to June 30; the sun being free from spots on those days) July, 19.8; August, 21.3; September, 3.4; October, 3.3; November, 9.8; December, 17.0. Yearly mean 18.1.

These relative numbers being computed from Wolf's formula $r = 10g + f$, where g is the number of groups visible on any day, and f the total number of spots, whether they were in the groups or isolated.

SEISMOLOGY

The Milne instrument was dismantled from October 9 to the 16th while the newly purchased and much more sensitive instrument was being tested. Apart from this interval there was practically no loss of trace throughout the year. The period of the boom has been kept at 18 seconds, and the constants of the instrument after October 16 were the same as previous to dismantling.

The most important earthquakes during the year were: April 8 (Amplitude 9 mm.); May 12 (5 mm.); June 12 (9 mm.); November 11 (9.6 mm.); January 22 (10 mm.); February 2 (6.7 mm.); February 3 (Over 30 mm.).

The epicentres of some of these were: January 12, off the coast of SW. Mexico. November 11, the destructive Chilean earthquake, latitude $28^{\circ} 48'$ south, longitude $72^{\circ} 40'$ west, approximately 144 km. off shore, time at com-

mencement being 4h. 32m. 29s. G.M.T. Several tidal waves followed this earthquake which caused destruction in the coast cities of Northern Chili with a large loss of life. January 22, Northern California; February 3, one of the largest we ever recorded had its centre in the bed of the Pacific in latitude $9^{\circ} 56'$ north, and longitude 142° west, southeast of the Hawaiian islands. The tidal waves from this earthquake caused much damage in the islands and the waves were registered on the tidal gauges of the North Pacific. The disturbance of February 2 was possibly centred in the same locality but not having reliable data as yet, we are unable to draw it in. A pronounced earthquake was felt throughout the Maritime Provinces on July 2, being especially severe in Northern New Brunswick. Charlottetown, P.E.I. reports: "A distinct shock at 5h. 24m. Atlantic standard time. Many thought of the Halifax explosion." Moncton felt it at 5h. 25m. p.m. This earthquake was not registered on our seismograph.

The distribution of all disturbances throughout the year is shown in the following table:—

April 10, May 7, June 5, July 2, August 11, September 7, October 9, November 8, December 15, January 5, February 20, March 17, total 116.

The total is about 14 less than the average and 23 greater than last year.

Abstracts of the Toronto and Victoria seismograms are forwarded monthly to various research workers and are also published in the Toronto Meteorological Year Book.

APPENDIX "A"

The Director of the Quebec Observatory reports as follows:—

In addition to the usual meteorological observations which were taken without interruption, special reports were furnished daily to the public through the newspapers and otherwise. Extracts from the records of the observatory were also prepared for the courts in many cases.

Barometers and thermometers were compared with our standards, and several chronometers were kept during the winter and rated, also sidereal watches for land surveyors.

The daily rate of the clocks was obtained by observations of stars on nearly every fine night, and also by the sun.

The correct time was given as usual by means of the noon-gun, by the time-ball and the telephone. The standard time was continued during the summer at the observatory, but daylight saving time having been adopted by the city, the noon-gun was fired an hour earlier to correspond with the advanced hour.

Navigation opened last year on April 25 and the time-ball has been working in a satisfactory manner until December 11, end of the navigation season. It is now being overhauled by the men of the Quebec agency of the Department of Marine and Fisheries, and will be ready for the opening of next season.

The Bell Telephone Company having discontinued, this year, their practice of giving the time to the public, the number of inquiries in this respect has increased to such an extent that it is now practically impossible to answer all the calls made on this office.

The population of this city being now nearly one hundred and twenty thousand, may I suggest that some system be adopted whereby time be given to all the wards of the city by a master clock by means of the fire alarm system.

The weather bulletins published by the Meteorological Service at Toronto have been posted regularly at the public buildings, and printed in all the newspapers. This service is greatly appreciated by the public. Inquiries by farmers and tourists respecting the weather conditions and probabilities have been very numerous.

APPENDIX " B "

The Director of the St. John, N.B., observatory reports as follows:—

The regular chief station Meteorological observations have been made without interruption. Eye readings of the standard instruments made tri-daily, check and autographic recorders from which hourly values are tabulated and daily and monthly means abstracted. From the tabulated records of the recording as well as the eye reading instruments, values of any meteorological element may be accurately given for any hour day or night. Results of the morning and night observations have as usual been telegraphed to your central office for purposes of the weather chart.

All meteorological instruments and apparatus have been maintained in efficient and satisfactory condition. Changes of the anemometers at St. John and Point Lepreaux for cleaning, adjusting and oiling are made at as frequent intervals as practicable.

The daily record sheets from the Point Lepreaux wind station are sent here weekly and the necessary analysis and tabulation done in this office.

Acting as provincial agent, the monthly reports from all observing stations in the Maritime Provinces are received here, checked, summed and meaned and the necessary climatological and statistical data entered in our abstract registers for the purpose of replying promptly to inquiries for weather conditions from the various stations in the Maritime Provinces.

Practically every day telephone, letter and personal calls are received from the transportation companies, shippers and others asking for weather, wind, rain or snowfall and temperature conditions on specified dates. In many cases claims for damage to perishable goods in transit are settled out of court from our local and maritime records. During the past year an unusual amount of data has been requested and furnished to hydrological and other engineers. This means a considerable amount of clerical work, which could scarcely be accomplished without the indispensable aid of an adding machine to take out the sums and means for this and the general office work.

An ever increasing number of telephone calls are daily and frequently at night received for the forecasts, time and other information pertaining to the service.

The weather bulletin telegraphed here each week day morning is decoded and printed in the observatory as in past years. Since the postal regulations cancelled its free distribution through the mails, the issue has been somewhat curtailed, but several shipping and commercial firms willingly pay the necessary postages on the bulletin for fying purposes in their establishments. It is also published in the evening papers supplemented by a report on local conditions.

On account of a new dwelling being erected for the light keeper at Point Lepreaux, an overhead cable was run from the staff carrying the anemometer and wind vane to the anemograph which had to be installed in the new dwelling.

During the past year some additions have been made to the rainfall stations at different points in the Maritime Provinces, but more are required to cover this territory.

MARITIME PROVINCE TIME SERVICE

Observations for time have been made on available clear nights with the Troughton & Simms astronomic transit, all observations have been made by the transit micrometer method, reversing the telescope on its axis to eliminate

collimation and pivot corrections, nine contacts are made in each position of the axis, the records from these contacts being registered on the chronograph along with the seconds from the observing clock.

The Kullberg and Riefler sidereal clocks have maintained steady rates, particularly the Riefler, which is run under constant temperature and pressure in the basement clock room. The sealing of the Riefler clock continues to remain absolutely perfect, changes of pressure by the air pump have not been necessary at any time throughout the year.

The mean time clock and its various electrical connections for automatically transmitting the daily time signal and hourly synchronizing clocks locally has given most satisfactory service. Comparisons are made with the sidereal clocks by the chronograph method and when necessary correction to the transmitting clock made by the electrical application of small weights as formerly reported.

The system, in operation for several years, of synchronizing clocks continues to give little or no trouble and as in the past has proved to be a most useful service. The Western Union Telegraph Company have increased the number of clocks daily synchronized from this observatory in their offices at different points throughout the Maritime Provinces.

The Halifax and St. John time balls have been operated as previously reported and the master clock in Halifax, which is synchronized by wire from St. John, serves the purpose of automatically dropping the time ball and sends an hourly signal for electrically correcting clocks in Halifax.

The so-called daylight saving time was locally adopted at some few places in the Maritime Provinces while other places continued the use of standard time, hence much confusion to the travelling public.

The New Brunswick Telephone Company have one, and the Western Union Telegraph Company two loop lines connected with the switch board in the observatory, for time signal purposes, both companies co-operate with us for the successful distribution of these signals.

APPENDIX " C "

The Director of the Gonzales Heights Observatory, Victoria, B.C., reports as follows:—

The regular meteorological observations have been taken and daily weather forecasts issued for the following districts: Victoria, Nanaimo, the Lower Mainland, Okanagan, Kamloops and Kootenay. In the spring and early summer when there is danger of frosts damaging the fruit trees in blossom, special temperature forecasts are furnished certain fruit centres in the Okanagan, and in the late autumn forecasts are issued respecting the probable advent of severe frosts. During the fruit shipping season daily information was wired certain large shippers as to the temperatures then and likely to occur in the Rockies and the Prairie Provinces.

Storm warnings have been issued for the ports of Victoria, Nanaimo and Vancouver, and during the stormy season numerous enquiries have been received from owners of small craft on this subject.

In the spring and early summer, the engineers engaged on important dyking operations on the Lower Fraser river were kept advised by wire of probable rises in the river level, and throughout the summer months the Provincial Forestry Department was kept informed of the weather conditions, and special forecasts were issued in advance of hot spells and high winds as an aid to the forest rangers in combating severe fires.

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Time Service.—During the past year the time-ball in the city has been regularly raised and dropped from this observatory at 1 p.m. Time guns at the Work Point Barracks have been fired from here at noon and 9 p.m. daily; the time is sent out daily by wireless at 10 a.m. and since January 1 at the request of certain Trans-Pacific shipping officials, it is also sent by wireless from here at 10 p.m. and relayed from the Estevan Wireless station to a radius of about 3,000 miles. These signals have been received by ships entering the Pacific at Panama and gratefully acknowledged to Mr. E. J. Haughton, District Radio Superintendent.

The two Milne-Shaw seismographs which were received here last autumn were shortly afterwards installed and most gratifying results are being obtained from them. They are so well constructed and delicately adjusted that whereas our old type of Milne seismograph recorded on an average about 100 earthquakes per year, these will average about 300 per year, and the types of waves are so clearly shown on these, that the positions of a large number of these quakes can be determined, as well as showing the true amplitude of the earthquake waves as they pass under this station.

During the year the ascents of 115 pilot balloons were observed through our special theodolite and a series of valuable courses and elevations of these was obtained.

The longest flight (in time) observed was 92 minutes on the 10th of November, 1922, indicating a maximum height of 46,000 feet, when the wind velocity reached 107 miles per hour.

The maximum horizontal distance of one of these balloons as observed was 29 miles on the 7th of February, which indicates a remarkably clear atmosphere as the balloon is less than 2 feet in diameter when released.

These balloon ascents are proving of value when studied in connection with our weather charts as an aid in weather forecasting, in determining average conditions to be encountered at various levels by aeroplanes, and the accumulated data will assist in International aerial research.

Nearly 2,000 visitors were shown over this institution during the past year and lectures have been given on Meteorology and Seismology.

APPENDIX " D "

The Director of the McGill University Observatory reports as follows:—

Time Service.—Sidereal observations for the determination of clock errors were made on seventy eight nights throughout the past year.

In addition, our time has been compared periodically with the noon and 10 p.m. signals broadcasted from Arlington Observatory. For this service, we are indebted to Mr. F. R. Redpath, and Mr. A. Stirling, both of Montreal.

The noon timeball has been dropped daily for the benefit of shipping, and other time signals distributed throughout the city and country as in former years.

The interchanges of clock signals with Toronto Observatory have been continued, comparisons having been made on fourteen occasions. Separate reports showing differences upon those days on which comparisons were made, attached herewith.

Meteorological Service.—The usual meteorological observations have continued throughout the year without interruption. These have been reduced, and results for each day have been published in the *Gazette*. Summaries for each month, and for the year have been distributed.

The number of persons desiring special information, continues to increase. These inquiries are, for the greater part from lawyers, engineers, corporations and from the newspapers, both English and French.

Telephone calls for the correct time have become very numerous of late. This has been brought about by the refusal of the Bell Telephone Company of Canada, to permit their operators to answer inquiries from subscribers as to the time.

The Governors of McGill University, have appointed the writer as Superintendent of the observatory, upon the resignation of the former superintendent, Mr. James Weir.

RESULT of Time Exchanges, Toronto vs. Montreal, for year ending
March 31, 1923.

Date	Montreal	Toronto
April 21, 1922.....	2 40 01.8 sl. 0.5	2 40 00.0 sl. 01.0
	2 40 02.3 Diff. 01.3 s.	2 40 01.0
May 12, 1922.....	3 37 59.7 sl. 0.5	3 38 0.0 f. 0.5
	3 38 00.2 Diff. 0.7 s.	3 37 59.5
June 23, 1922.....	3 49 46.0 0.0	3 49 46.5 f. .3
	3 49 46.0 Diff. 0.2 s.	3 49 46.2
July 14, 1922.....	2 49 06.00 sl. 0.25	2 49 05.5 sl. 0.1
	2 49 06.25 Diff. 0.65 s.	2 49 05.6
July 28, 1922.....	3 01 47.0 sl. .2	3 01 48.0 f. .2
	3 01 47.2 Diff. 0.6 s.	3 01 47.8
August 25, 1922.....	2 50 0.10 sl. 0.25	2 50 0.00 f. 0.05
	2 50 0.35 Diff. 0.4 s.	2 49 59.95
September 22, 1922.....	3 42 0.0 f. 0.2	3 42 0.0 sl. 0.2
	3 41 59.8 Diff. 0.4 s.	3 42 00.2
	Comparison by G.T.R. circuit as C.N.T. was open	
October 6, 1922.....	3 53 0.60 f. 0.15	3 53 0.0 sl. 0.8
	3 53 0.45 Diff. 0.35 s.	3 53 0.8
November 10, 1922.....	3 39 59.4 sl. 0.5	3 40 0.0 f. 0.7
	3 39 59.9 Diff. 0.6 s.	3 39 59.3

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RESULT of Time Exchanges, Toronto vs. Montreal, for year ending
March 31, 1923—Concluded

Date	Montreal	Toronto
November 24, 1922.....	3 44 59.0 sl. 0.8	3 45 0.0 f. 0.8
	3 44 59.8 Diff. 0.6 s.	3 44 59.2
December 15, 1922.....	3 38 0.0	3 38 03.0 f. 0.5
	.... Diff. 2.5 s.	3 38 02.5
January 19, 1923.....	3 51 00.0 sl. 0.4	3 51 0.9 sl. 0.3
	3 51 00.4 Diff. 0.8 s.	3 51 01.2
February 9, 1923.....	3 55 00 0	3 55 00.1 (by ear)
	3 55 00	....
	Comparison by G.T.R. circuit C.N.T. circuit was open	
February 23, 1923.....	3 41 01.5 f. 0.2	3 41 00.0 sl. 01.0
	3 41 01.3 Diff. 0.3 s.	3 41 01.0
April 13, 1923.....	3 42 00.95 f. .10	3 42 00.00 sl. .60
	3 42 00.85 Diff. $\frac{1}{4}$ s.	3 42 00.60

REPORT OF L. A. DEMERS, DOMINION WRECK COMMISSIONER

Formal investigations during the year.....	29
Preliminary inquiries during the year.....	5
Departmental inquiries during the year.....	2

During the calendar year 1922 there were 277 casualties reported to the department, the tonnage of same being 604,423 net, and the stated damage \$451,312, made up as follows: Ship, \$411,462; cargo, \$39,850, while 27 lives were lost.

Of the total number of casualties 231 were to coasting and sea-going vessels, the tonnage of same being 550,150 net and the stated damage \$113,712 made up as follows: Ship, \$93,862; cargo, \$19,850, while 12 lives were lost.

The remaining 46 casualties were to inland vessels, the tonnage of same being 54,273 net, the stated damage \$337,600, made up as follows: Ship, \$317,-600; cargo, \$20,000.

In 124 casualties to coasting and sea-going vessels and 27 casualties to inland vessels, the amount of damage is not stated.

Thirty-nine of the casualties to coasting and sea-going vessels, made up of 16 steam and 23 sailing vessels, resulted in total losses, the net tonnage of same being 11,546. Of this number 37 were Canadian, 1 British and 1 foreign vessels.

Five of the casualties to inland vessels, all Canadian, resulted in total losses, the net tonnage of same being 2,064. Of this number 4 were steam vessels.

The casualties are given under the following headings:—

COASTING AND SEA-GOING VESSELS

Collisions.....	63
Foundering.....	19
Missing vessels.....	1
Miscellaneous accidents, fire, loss of sails, etc.....	48
Strandings.....	100

INLAND VESSELS

Collisions.....	19
Foundering.....	2
Miscellaneous accidents.....	4
Strandings.....	21

STATEMENT of investigations into wrecks and casualties which occurred to British, Canadian and Foreign vessels

Name of ship and official number	Port of Registry	Remarks
Airdale..... 110105 and Orthia..... 106012	London..... Glasgow.....	On July 4 collided off White Island Reef Lightship, St. Lawrence River. Formal investigation was held at Quebec on July 20 an 21, before Capt. L. A. Demers, Dominion Wreck Commissioner, assisted by Capt. J. B. Henry and Capt. W. R. Miller, acting as Nautical Assessors. <i>Finding</i> "Orthia" alone to blame for collision. Master and Pilot are severely reprimanded, but in view of conditions of weather and tide, as well as locality, their certificates are not dealt with. Master and Pilot of "Airdale" are exonerated from blame.
Alaskan..... 130445	Vancouver.....	On January 2 lost in vicinity of Pachena Point, B.C., with all hands. Formal investigation was held at Vancouver on February 1 and 2, and at Victoria on the 8 and 9, before Capt. John D. Macpherson, Wreck Commissioner for B.C., assisted by Capt. A. P. W. Williamson and Capt. J. T. Esmunds, acting as Nautical Assessors. <i>Finding</i> Loss of vessel due to violence of gale then raging. Evidence not sufficient to arrive at a conclusion as to the particular manner in which the vessel was lost.
Baluchistan..... 135889	Newcastle-on-Tyne.	On August 26 stranded west of White Island Lightship, St. Lawrence River. Formal investigation was held at Quebec on September 15, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. J. B. Henry, acting as Nautical Assessors. <i>Finding</i> Pilot J. H. Talbot responsible for grounding of vessel. His license is not dealt with on account of his previous good record, but he is fined two hundred dollars.
Bayusona..... 140405 and Frank D. Ewen..... 130321	Montreal..... Montreal.....	On November 18 collided between Locks 1 and 2, Lachine Canal. Preliminary enquiry was held at Montreal by Capt. J. O. Grey. Formal investigation not held.
Canadian..... 125427	Montreal.....	On April 17 stranded near Giant's Tomb, Georgian Bay. Formal investigation was held at Collingwood, on May 15, before Capt. L. A. Demers, assisted by Capt. F. A. Bassett and Capt. F. G. Moles, acting as Nautical Assessors. <i>Finding</i> Master, H. A. Patterson, to blame for accident. He is severely reprimanded for lack of judgment and warned to be more careful in future. His certificate is not dealt with, as the Court takes note of the failure of the range lights to operate.
Canadian Squatter..... 141853	Montreal.....	On June 4 collided with the Drawbridge at Newcastle, N.B. Formal investigation was held at Chatham on June 13 and 14, before Capt. L. A. Demers, assisted by Capt. R. A. Maclean and Capt. C. Mitchell, acting as Nautical Assessors. <i>Finding</i> Bridge Tender, Lawrence Coughlin, chief factor in this accident, being neglectful in his duties. Pilot found at fault for assuming that the bridge would open, basing himself on a dangerous custom. Capt., F. W. Boulton, exonerated, in view of the fact that he was a stranger in the place and his judgment was influenced by the pilot. He is cautioned to use his own judgment in future. In view of dissenting reports of assessors, the Pilot's license was returned to him.

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STATEMENT of investigations into wrecks and casualties which occurred to British, Canadian and Foreign vessels—*Continued*

Name of ship and official number	Port of Registry	Remarks
Cairndhu..... 1142828 and Spray..... 100727	Newcastle..... Montreal.....	On July 1 collided above Sorel. Formal investigation was held at Montreal on July 5, 6 and 17, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. J. B. Henry, acting as Nautical Assessors. <i>Finding</i> : "Spray" chiefly to blame for collision on account of inexcusable manoeuvre, and Master, Napoléon Mongeau, culpable of negligence. His certificate is suspended for a year. Master of "Cairndhu," exonerated from blame. Certificate of 2nd officer of "Cairndhu," Thos. D. Healy, suspended for six months and that of E. A. Paquin, Pilot, for a year.
Canadian Commander	Montreal	
Cymric Queen..... 21729 and Barge S.O.C. No. 41..... 116952, in tow of tug Gerald Morgan.	Vancouver..... Sarnia, Ont.....	On September 30 collided in Lake St. Peter. Formal investigation was held at Quebec on October 20 and at Montreal on November 2, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. J. Blanchard, acting as Nautical Assessors. <i>Finding</i> : Master, 1st Officer and Pilot of "Cymric Queen" exonerated from blame. Tug "Gerald Morgan" with Barge S.O. Co. No. 41 responsible for collision.
Calgarolite..... 150248 and Frontenac..... 107668	Halifax..... Quebec.....	
Cairndhu..... 142828	Newcastle.....	On November 18 collided in Quebec harbour. Formal investigation was held at Montreal on November 22, before Capt. L. A. Demers, assisted by Capt. Art. Lefebvre and Capt. H. W. Robson, acting as Nautical Assessors. <i>Finding</i> : Master and 1st Officer of "Calgarolite" exonerated from blame. Pilot, L. E. Thivierge, did not exercise proper vigilance and he is fined \$100.
Canadian Farmer..... 141590	Collingwood.....	On November 21 stranded at Confederation Point, St. Lawrence River. Formal investigation was held at Quebec on December 12, before Capt. L. A. Demers, assisted by Capt. A. Landry and Capt. Wm. Tremblay, acting as Nautical Assessors. <i>Finding</i> : Master, Wm. Whitehead, and Chief Officer, L. Halcrow, exonerated from all blame. Pilot, J. A. Gariépy, committed an error in assuming that his ship was in a certain position without verifying his assumption. His license is not dealt with on account of his previous good record.
Empress..... 116309	Charlottetown.....	On June 18 struck obstruction in Porlier Pass; former master preferred charges of falsifying entries in log. Formal investigation was held at Vancouver on October 23, November 14, 15, 16 and 17, before Capt. John D. Macpherson, assisted by Capt. A. R. W. Williamson and Capt. H. M. Watkins. <i>Finding</i> : Casualty due to error of judgment on part of Master, Wm. John Boyd, who is reprimanded. He is ordered to pay cost of proceedings. Charges of falsifying entries in Log unwarranted and unjustifiable.
Eibergen..... 12423	London.....	On September 29 stranded near Black Point, Bay of Fundy. Formal investigation was held at St. John, N.B., on October 12, before Capt. L. A. Demers, assisted by Capt. A. J. Mulcahy and Capt. W. E. Parker, acting as Nautical Assessors. <i>Finding</i> : Master, Andrew McDonald, in default. This being his first mishap and having given straightforward evidence in Court, his certificate is not dealt with, but he is reprimanded and cautioned to be more careful in future. Chief Officer is reprimanded for not having taken a more accurate bearing of the sounds and made his report accordingly.
Eleanor (gasoline launch).... and Nereid 56742	St. John, N.B.....	On September 2 stranded off Batiscan. Preliminary enquiry was held at Montreal on September 28, by Capt. J. O. Grey. Formal investigation unnecessary.
Eureka..... 93940	Quebec.....	On October 26 collided in St. John harbour. Formal investigation was held at St. John on December 20, before Capt. L. A. Demers, assisted by Capt. A. J. Mulcahy and Capt. Wm. G. Hurley, acting as Nautical Assessors. <i>Finding</i> : Master of tug "Nereid," J. L. B. Makiny, solely to blame for collision. He is severely reprimanded.
Glenfinnan..... 126659 Midland King..... 116661	Quebec..... Midland..... Midland	Charges of misconduct against Master, Steward and other members of crew. Departmental enquiry was held at Quebec on March 14 and 19 and at Father Point on the 16th, by Capt. L. A. Demers. The Commissioner suggests the mutation of Master to some other service; that every member of crew, apart from 1st Officer, be dismissed; that new crew be engaged from some other community; that Assistant Superintendent at Father Point be superannuated on account of his advanced age.
		On May 18 collided in Lake Superior. Formal investigation was held at Port Arthur on June 1 and 2, before Capt. L. A. Demers, assisted by Capt. W. J. Moles and Capt. A. T. Thompson, acting as Nautical Assessors. <i>Finding</i> : Master of "Midland King," R. F. Pyette, in default for leaving his post in foggy weather. His certificate is suspended for two months. 1st Mate of "Midland King," N. H. Miller, in default for violation of the rules of the road for the Great Lakes. His certificate is suspended for three months. Master of "Glenfinnan," J. N. Foote, in default for violating Rules 22, 19 and 38. His certificate is suspended for two months.

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STATEMENT of investigations into wrecks and casualties which occurred to British, Canadian and Foreign vessels—*Continued*

Name of ship and official number	Port of Registry	Remarks
Glenmoor..... 112915	Aberdeen.....	On October 15 stranded in Montreal harbour. Formal investigation was held at Montreal on October 24, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. J. B. Henry, acting as Nautical Assessors. <i>Finding</i> Pilot, Come Dufresne, in default. He is fined \$100.
Indochine..... and Sarmatia.....	(French)..... (Danish).....	On August 11 collided opposite Three Rivers. Formal investigation was held at Montreal on August 22, 23 and at Quebec and Lauzon on the 24th, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. J. B. Henry, acting as Nautical Assessors. <i>Finding</i> "Indochine" solely to blame for collision. Pilot, J. B. Angers, found in default. His license is suspended for six months of navigation.
Izgled..... and Orkild.....	(Jugo-Slavia)..... (Danish).....	On October 12 collided near Buoy 76Q, St. Lawrence River. Formal investigation was held at Montreal on October 23 and 24, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. J. Blanchard, acting as Nautical Assessors. <i>Finding</i> The "Izgled," through no fault of the operatives, became uncontrollable and collided with "Orkild." Therefore, the Master, Officers and Pilots of both vessels are held blameless of any neglect or error of judgement for this casualty.
Joyland..... 138108	Montreal.....	On April 27 stranded south side of Little Round Island, St. Lawrence River, and subsequently lost. Preliminary enquiry was held at Montreal on May 3, by Capt. L. A. Demers. <i>Decision</i> No neglect on the part of those in command; casualty due to parting of a steering wire. Further proceedings unnecessary.
John B. Ketchum..... 130435	Montreal.....	On July 1 stranded in Saguenay River. Formal investigation was held at Montreal on August 21, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. T. R. Coffin, acting as Nautical Assessors. <i>Finding</i> Pilot, Geo. Ed. Koenig, to blame for accident. He is fined \$100.
Keywest..... 121458 and Glenmavis..... 133533	Newcastle..... Midland.....	On May 9 collided in Welland canal. Formal investigation was held at Montreal on June 26, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. A. Lefebvre, acting as Nautical Assessors. <i>Finding</i> "Glenmavis" alone to blame. Capt., A. Mackay, is reprimanded and cautioned for his lack of judgment. His certificate is not dealt with as the first impact and the striking of the "Keywest" could have been brought about by either ship's suction.
Louis Joseph..... 126931	Quebec.....	On November 17 was wrecked between Chicoutimi and Rivière-aux-Vases. Preliminary enquiry was held at Chicoutimi on April 6 by Capt. L. A. Demers. <i>Decision</i> Ludger Savard, one of the passengers, lost his life through no fault of the Master or Engineer. Mrs. Savard will have to meet any demands for witness fees, as her accusations of negligence were not substantiated.
Mapledawn..... 141836	Montreal.....	On April 24 stranded opposite l'Isle-à-l'Aigle, St. Lawrence River. Formal investigation was held at Montreal on May 23, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. A. Lefebvre, acting as Nautical Assessors. <i>Finding</i> Pilot, Geo. Arcand, did not exercise proper vigilance, but owing to the fact that the buoying of that narrow stretch had not been completed, his license is not dealt with. He is fined \$100. Master, J. P. Dufour, is exonerated from blame for grounding, but he is reprimanded for his absence from the bridge.
Montcalm..... 145903	Liverpool.....	On June 2 stranded opposite and south of Bigot island. Preliminary enquiry was held at Quebec on June 7, by Capt. L. A. Demers. <i>Decision</i> No one to blame; accident due to expansion of some part of the steering gear.
Mina Brea..... 125773 Long Sault..... 126853 Barge "Manon L".....	Sarnia..... Quebec.....	On May 28 "Mina Brea" and "Manon L" collided whilst the latter was in tow of tug "Long Sault." Formal investigation was held at Montreal on June 24, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. A. Lefebvre, acting as Nautical Assessors. <i>Finding</i> "Mina Brea" to blame for collision. Pilot, J. B. Angers, in default for inattention and bad lookout, involving wrong movement of the helm of ship. He is fined \$200. 2nd Officer, W. A. Poole, severely reprimanded for indifferent lookout and failing to call Master at first appearance of danger. Capt. A. Geddes warned and cautioned about his responsibilities as Master. Captain of barge "Manon L," Edgar Thibaudeau, in hard starboarding when fast to the tow line, brought about the damage done to the barge. He is severely reprimanded.
Modica.....	Norwegian.....	On October 17 stranded in Montreal harbour. Formal investigation was held at Montreal on October 27, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. J. Blanchard, acting as Nautical Assessors. <i>Finding</i> Master, Officers and Pilot exonerated from all blame.
Plante Onésime, Light-keeper at Louiseville.		Charges of neglect in his duties. Departmental investigation was held at Louiseville on August 23 by Capt. L. A. Demers, who recommends that Plante be reinstated.
Princess Beatrice..... 116415 and Camosun..... 121204	Victoria..... Vancouver.....	On January 20 collided two miles west of Kingcombs Point, McKay Reach, B.C. Formal investigation was held at Vancouver on March 6, 7 and 8, before Capt. John D. Macpherson, assisted by Captains Harry Mowatt and Wm. Wright, acting as Nautical Assessors. <i>Finding</i> 2nd Mate of "Princess Beatrice," G. S. Forbes, and 1st Mate of "Camosun," S. Nelson, to blame for not having reversed engines sooner. They are censured for having taken such risks.

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STATEMENT of investigations into wrecks and casualties which occurred to British, Canadian and Foreign vessels—*Concluded*

Name of ship and official number	Port of Registry	Remarks
Rainbow No. 2..... 134633 and Barges in tow of tugs— Tepic and..... 87180 We Two..... 122541	Victoria..... London..... Vancouver.....	On December 26 Collided in Nanaimo harbour. Formal investigation was held at Nanaimo on January 16 and 17, before Capt. John D. Macpherson, assisted by Capt. A. P. W. Williamson and Capt. F. Cutler, acting as Nautical Assessors. <i>Finding:</i> No one to blame; accident was unavoidable under existing conditions.
Senator Derbyshire..... 112351	Montreal.....	
Scotia No. 1..... 110865	Ottawa.....	
Saskatoon..... 123965	Montreal.....	On April 28 stranded opposite l'isle-aux-Vaches, St. Lawrence river. Formal investigation was held at Montreal on June 6, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. A. Lefebvre, acting as Nautical Assessors. <i>Finding:</i> Pilot, Severe Perron, at fault for culpable error of judgment, but as there was no attempt on his part to make false representations, he is only fined \$50. Master, J. B. Gamache, reprimanded for being away from his post.
Trevisa..... 133573 and Iocomo..... 139745	Montreal..... Sarnia.....	On May 7 stranded west of Carleton Point, P.E.I. Formal investigation was held at Mulgrave on June 17, before Capt. L. A. Demers, assisted by Capt. N. E. Morris and Capt. A. Garrison, acting as Nautical Assessors. <i>Finding:</i> Master, J. N. McKinnon, exonerated from blame; stranding attributed to currents which were northerly in that vicinity, the velocity being under estimated.
Tuscan Prince..... 133543	Newcastle.....	On October 21 destroyed the gates of Lock 1 in Lachine canal. Formal investigation was held at Montreal on November 7 and 8, before Capt. L. A. Demers, assisted by Capt. A. Lefebvre acting as Nautical Assessor, and Mr. B. Langan as Engineer Assessor. <i>Finding:</i> Master, W. E. Cornett, exonerated from blame. Chief Engineer, J. B. McLaren, made a mistake in operating his levers. He is severely reprimanded and cautioned to be more careful in future.
		On May 14 collided in Welland canal. Formal investigation was held at Montreal on June 5, before Capt. L. A. Demers, assisted by Capt. Chs. Lapierre and Capt. A. Lefebvre, acting as Nautical Assessors. <i>Finding:</i> "Iocomo" responsible for collision, but in view of the manner in which the impact took place, the Court cannot adjudge any responsibility to the Captain or Officers.
		On February 14 stranded and lost near Village Island, Barclay Sound, B.C. Formal investigation was held at Vancouver on March 1, before Capt. John D. Macpherson, assisted by Capt. Wm. Wright and Capt. Harry Mowatt, acting as Nautical Assessors. <i>Finding:</i> No one to blame: loss of vessel due to abnormal current setting to the northward, during bad weather conditions.

STATEMENT of wrecks and casualties reported as having occurred to British, Canadian and Foreign vessels in Canadian waters and to Canadian vessels in other waters, from January 1 to December 31, 1922

COASTING AND SEA-GOING WRECKS

Date of Casualty	Name of Ship Official No.	Age of Ship Years	Registered Port	How rigged Iron or wood Steam or sail	Register Tonnage	Port sailed from Port bound to	Place where Casualty happened	Particulars of Casualty Name of Master	Lives lost	Loss Total or Partial
Jan. 3	Alexandra 112107	19	Lunenburg, N.S.	Schr. Wood. Sail.	93-07	Ingonish, N.S. Gloucester, Mass.	Black Point, N.S.	Wrecked M. G. Munroe.	.....	Total.
Mar. 10	Anna McDonald 141239	2	Charlottetown, P.E.I.	Schr. Wood. Sail.	191	Cardigan, P.E.I. Baltimore.	Off Cape Henry, Chesapeake Bay.	Main boom broken. W. A. Miller.	.....	Partial, \$300.
Mar. 29	Avon Queen 141071	3	Windsor, N.S.	Schr. Wood. Sail.	939	New York Newport News.	Chesapeake Bay, Va.	Collided with "Frode". W. R. Merriam.	.....	Part.
May 9	Arbico 104543	28	London	Schr. Steel. Steam.	396	Liverpool Quebec.	20 miles E. of Cape Race	Stranded Capt. Cameron.	.....	Total, \$30,000.
May 19	Ada A. McIntyre 138593	4	St. John, N.B.	Schr. Wood. Sail.	423	.....	Grand Manon	Stranded	.....	Part.
June 8	Abbie Kest 107798	28	St. John, N.B.	Schr. Wood. Sail.	96	Parrsboro, N.S. Parrsboro, N.S.	Black Rock, Minas Basin.	Stranded Geo. Bullerwell.	.....	.....
July 5	Airdale 110105	23	London	F. & A. Steel. Steam.	1,948-74	Quebec Campbellton.	Off White Island, St. Lawrence river.	Collided with "Orthia" J. N. Butcher.	.....	Slight damage.
Aug. 1	Anthony	2	Tacoma	Schr. Steel. Steam.	2,994	Montreal Danish Ports.	Montreal Harbour	Collided with <i>Elswick Park</i> . M. J. Brennan.	.....	Slight damage.
Aug. 27	Atacama 138242	6	Lunenburg, N.S.	Schr. Wood. Sail.	96-21	Grand Banks, Nfld.	High Beach, Nfld.	Stranded Geo. Handrican.	.....	Total, \$14,000.
Sept. 27	Ada Tower 138472	6	Parrsboro, N.S.	Schr. Wood. Sail.	528	New York Gaspe.	Lat. 40° 5' N. Long. 61° 10' W. No. Atlantic.	Damaged in gale. John Pratt.	.....	Part.
Oct. 3	Atlantic City 140863	2	Bideford, Eng.	Schr. Steel. Steam.	3,902	.....	Montreal Harbour	Collided with <i>Falls City</i>.	.....	Slight.
Nov. 3	Arkona 142026	4	St. Johns, Nfld.	Schr. Wood. Sail.	69	.....	Sydney Harbour, N.S.	Stranded	.....	Slight.
Nov. 9	Admiral Schley 107423	Tacoma	Schr. Steel. Steam.	1,336	San Francisco Vancouver.	Burrard Inlet, B.C.	Collided with <i>N.Y. Ferry</i> . G. A. Harris.	Slight.
Dec. 4	A. B. Barbeau	Change Island, Nfld. Newark, N.J.	Loss of sails	Part. \$1,500.

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Dec. 25...	Alaskan. 130140	36	Vancouver.....	F. & A. Wood. Steam.	102	Victoria, B.C. Kildona.	Abeam Race Rock, Canada.	Damaged by fire. J. A. Baillies.	Part, \$300.
Dec. 29...	Annie L. Spindler. 126585	13	Yarmouth, N.S.....	Schr. Wood.	95	St. Pierre Miquelon.....	Race Point, Mass.....	Stranded. Denis Ameror.	Total.
Jan. 12...	Barbara H. 141261	3	Parrsboro, N.S.....	Schr. Wood.	286	Nassau. Parrsboro. Boston.	Lat. 66° 39' N. Long. 44° 22' W. No. Atlantic.	Damaged in gale. Geo. E. Merriam.	Part.
Feb. 6...	Bessie Dollar. 121272	16	Vancouver.....	F. & A. Steel.	2,797	Vancouver. Nogi, Japan.	Lat. 52° 08' N. Long. 150° 00' W. Pacific Ocean.	Damaged in gale. M. Ridley.	Part. 1
Feb. 6...	Bessie A. White. 141266	2½	Parrsboro.....	Schr. Wood.	594	Newport News, Va. St. John, N.B.	Smith's Point, Long Island, N.Y.	Foundered..... L. T. Merriam.	Total.
Mar. 24...	Burrard Chief. 141702	3	Vancouver.....	Schr. Wood.	56-92	Esquimalt, B.C. Esquimalt, B.C.	Esquimalt Harbour.....	Collided with <i>Calgarolite</i> Capt. Anderson.	Part, \$3,500.
April 12...	Bristol. 79988	43	Windsor, N.S.....	Schr. Wood.	1,305	Windsor. New York.	Isle Haute, Me.....	Foundered..... S. M. Mowick.	Total— Ship, \$35,000. Cargo, 10,000 Total, \$80,000.
July 31...	Brunath. 141846	3	Quebec.....	Schr. Wood.	661-83	Montreal Port Daniel, Que.	Port Daniel.....	Burnt..... Adrien Dube.	Part.
Aug. 26...	Baluchistan 135889	9	Newcastle.....	Schr. Steel.	2,484	Montreal Rotterdam.	White Island Lightship	Stranded..... L. Longridge.	Part.
Sept. 21...	Beaver 100056	31	Charlottetown.....	Schr. Wood.	192	Gaspe Boston.	Off Beaver Light, N.S.	Sprang a leak..... S. Cann.	Part.
Oct. 20...	Bessie 100345	26	Digby, N.S.....	Schr. Wood.	88	Port Hawkesbury.....	Strait of Canso.....	Sprang a leak.....	Part.
Nov. 19	Beckenham 114711	21	London.....	Schr. Steel.	2,875	Cardiff. Sydney, N.S.	2 miles E. Cape St. Michel Signal.	Stranded..... E. J. Feather.	Part.
Nov. 24	Beland.....	4	Lahave, N.S.....	Schr. Wood.	35	Woods Harbour, N.S. Barrington, N.S.	Off Cape Negro, N.S.....	Foundered..... Stanley Doane.	Total.
Nov. 24	Baroda 98301	31	Vancouver.....	Barge Steel.	1,352-88	Tacoma. Anyox.	Porlier Pass, B.C.....	Stranded E. Fulton.	Part.
Jan. 11	Canadian Runner. 141834	2	Montreal.....	Schr. Steel.	1,812	St. John, N.B. Liverpool.	Liverpool.....	Collided with pier D. D. Davies.	Part.
Jan. 11	Canadian Observer... 141771	2	Montreal.....	Schr. Steel.	1,460	Ocean Falls, B.C. Union Bay.	Discovery Passage.....	Stranded..... A. O. Cooper.	Slight.
Jan. 13	Canadian Winner 141862	1	Montreal.....	Schr. Steel.	3,375	Vancouver. Victoria.	First Narrows. Vancouver,	Stranded. W. Wingate.	Part.
Jan. 15	Clinton 146937	10	Victoria.....	Schr. Wood.	59-50	Vancouver Vancouver.	Entrance First Narrows, Vancouver.	Collided with <i>Princess</i> <i>Royal</i> .	Total.
Feb. 9	Canadian Trooper. 14143	3	Montreal.....	Schr. Steel.	1,952	St. John, N.B. Avonmouth.	Lat. 48° 48' N. Long. 39° 00' W. No. Atlantic.	Damaged in gale F. J. Ormrod.	Part.

STATEMENT of wrecks and casualties reported as having occurred to British, Canadian and Foreign vessels in Canadian waters and to Canadian vessels in other waters, from January 1 to December 31, 1922—*Continued*

COASTING AND SEA-GOING WRECKS—*Continued*

Date of Casualty	Name of Ship Official No.	Age of Ship Years	Registered Port	How rigged Iron or wood Steam or sail	Register Tonnage	Port sailed from Port bound to	Place where Casualty happened	Particulars of Casualty Name of Master	Lives lost	Loss Total or Partial
Mar. 1...	Coaster 138304	5	Vancouver	Schr. Wood.	99	Tacoma, Wash. Nanaimo.	Powder Point, B.C.	Crack in shaft. M. F. Macdonald.	.....	Part, \$300.
Mar. 8...	Canadian Inventor 141705	2	Montreal	Schr. Steel.	3,334	Vancouver Kobe, Japan.	Chemainus, B.C.	Stranded. F. Dudley.	.....	Part.
Mar. 10...	Chilco 87034	38	Vancouver	Schr. Steam.	197.03	Vancouver	Vancouver Harbour	Damaged by fire. Neil Gray.	.....	Part, \$3,000.
April 12...	Cumberland Queen 141514	2	Parrsboro, N.S.	Schr. Wood.	634.12	New Orleans New York.	Hatteras shoals	Foundered. L. C. Tower.	.....	Total.
April 29...	Cairnmona 140707	4	Newcastle	Schr. Steel.	2,775	Leith Montreal.	Point Tupper, Gut of Canso.	Rudder trouble. A. W. Milling.	.....	Part, \$20,000.
April 25...	Champlain 103956	25	St. John, N.B.	Schr. Wood.	267	St. John, N.B. Jenseg, N.B.	Glenwood Wharf, St. John river.	Foundered. R. D. Flower.	.....	Total, \$25,000.
April 29...	Cheam 96995	31	Vancouver	Schr. Wood.	558.27	Vancouver	Vancouver Harbour	Damaged by fire. F. Gilbert.	.....	Part, \$5,000.
May 4...	Canadian Sapper 141859	2	Montreal	Schr. Steel.	1,041.24	Montreal	Montreal Harbour	Collided with <i>Merry-mound</i>.	.....	Part, \$5,000.
June 29...	Cape La Have 141136	4	La Have, N.S.	Schr. Wood.	363	New York Liverpool, N.S.	Green Island Ledges	Stranded. E. A. Sarty.	.....	Part, \$500.
July 1...	Cairndhu 142828	3	Newcastle-on-Tyne	Schr. Steel.	3,218	Leith, Scotland Montreal.	5 miles above Sorel, St. Lawrence river.	Collided with <i>Spray</i> . Wm. Whitehead.	.....	Slight.
July 3...	Canadian Commander 141832	2	Montreal	Schr. Steel.	3,347.47	Montreal London and Antwerp.	South side Little Miquelon island.	Stranded. D. H. Maclean.	.....	Total, \$25,000.
July 13...	Canadian Runner 141834	2	Montreal	Schr. Steel.	1,811.78	Montreal Glasgow.	Perch, East of Longhaugh Bruce, Clyde.	Stranded. D. O. Davies.	.....	Slight.
July 18...	Canadian Farmer 141590	2	Montreal	Schr. Steel.	1,460	Vancouver Nanaimo.	Danger Reef, B.C.	Stranded. W. J. Boyd.	.....	Part, \$8,000.
July 20...	Canadian Pioneer 140958	3	Montreal	Schr. Steel.	2,548.51	Montreal Liverpool.	Montreal Harbour	Stranded. P. St. A. Robertson.	No damage.

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July 29..	Canadian Rover..... 141856	2	Montreal.....	F. & A..... Steel. Steam.	1,464	Vancouver..... Vancouver.	Porlier Pass, B.C.....	Stranded..... A. Forson.	Part, \$6,000.
Aug. 12..	Canadian Signaller..... 141479	3	Montreal.....	Schr..... Steel.	1,454-58	East Bay, C.B..... Waddington, N.Y.	Lachine Canal.....	Collided with bridge..... J. H. Hurley.	Part, \$500.
Aug. 15..	Comino..... 142258	3	London.....	Schr..... Steel.	2,932	Montreal..... Hull, Eng.	St. Therese Channel, St. Lawrence river.	Stranded..... R. H. Leaman.	Slight.
Aug. 24..	C. & W. No. 5..... 130291	13	Vancouver.....	Schr..... Steel.	134-07	Nanaimo..... Vancouver.	English Bay, Gulf of Georgia.	Upset..... F. A. Gilawson.	Part, \$200.
June 4..	Canadian Squatter..... 141853	2	Montreal.....	Schr..... Steel.	1,900	.....	Newcastle, N.B.....	Collided with Bridge..... F. W. Boulton.	Part.
Aug. 29..	Canadian Transporter..... 150448	1	Vancouver.....	F. & A..... Steel.	3,352	Vancouver..... Cheminus.	First Narrows, Burrard Inlet.	Stranded..... A. B. Watson.	Slight.
Aug. 30..	Clan Macvicar..... 141878	4	Glasgow.....	Schr..... Steel.	3,621	Tijlajop..... Vancouver.	Burrard Inlet, B.C.....	Stranded..... Geo. P. Phillips.	Part, \$2,500.
Aug. 31..	Canadian Beaver..... 141592	2	Montreal.....	Inst..... Steel.	1,451	Montreal..... Montreal.	Carribean Sea.....	Loss of propeller blade..... J. F. Smitzer.	Part.
Sept. 13..	Cashier..... 138759	4	Halifax.....	Schr..... Wood.	660	Jacksonville..... Trinidad.	Lat. 37° 45' N. Long. 66° 25' W	Sprang a leak..... John A. Stewart.	Part.
Sept. 15..	Centa..... 145235	1	London.....	Schr..... Sail.	1,003	London, Eng..... Chicoutimi, Canada.	No. Atlantic. Chicoutimi.....	Stranded.....	Part.
Sept. 16..	Colin W..... 134347	41	Montreal.....	Wood. Steam.	969	Montreal..... Quebec.	Batture-au-Fer, St. Law- rence River.....	Stranded..... A. Lambert.	Part.
Sept. 22..	Colonial..... 118005	20	Liverpool.....	Steel. Steam.	3,172	Montreal.....	$\frac{1}{4}$ mile west of Quebec Bridge.	Stranded.....	Part.
Sept. 30..	Cynric Queen..... 135516	10	London.....	Schr..... Steel.	2,421	Sydney, N.S..... Montreal.	Second buoy east of Rai- sin island, Lake St. Peter.	Collided with S. O. Co. No. 41. Geo. Higgenbotham.	Part. Part, \$1,500.
Oct. 10..	Canadian Prospector..... 141729	2	Montreal.....	Schr..... Steel.	5,492-09	Vancouver..... Kobe, Japan.	Yokohama Harbour.....	Boiler trouble..... C. Wallace.	Part.
Nov. 8..	Canadian Coaster..... 150351	2	Montreal.....	Schr..... Steel.	1,469	Montreal..... Barbadoes.	Montreal Harbour.....	Stranded..... W. E. Baker.	Part.
Nov. 16..	Carolyn..... 25445	5	Ketchikan.....	Schr..... Wood.	18	Ketchikan..... Prince Rupert.	Near Prince Rupert.....	Stranded..... A. J. Anderson.	Slight.
Nov. 18..	Calgarolite..... 150248	1	Halifax.....	Schr..... Steel.	5,510	Bay Town, Texas..... Montreal.	Quebec Harbour.....	Collided with Frontenac..... Jas. Colin.	Part, \$200.
Nov. 21..	Cairndhu..... 142828	3	Newcastle.....	Schr..... Steel.	3,218	Montreal..... Newcastle-on-Tyne.	Near Jean-Gros Point, St. Lawrence River.	Stranded..... Wm. Whitehead.	Part.
Nov. 22..	Canadian Constructor..... 150145	1	Halifax.....	Schr..... Steel.	4,413	Quebec..... London.	River Thomas.....	Collided with Long- stream. H. B. Webb.	Part.
Dec. 27..	Cowickhan..... 126210	15	Vancouver.....	F. & A..... Steel. Steam.	520-16	Vancouver..... Knox Bay.	Johnstone Strait, B.C.....	Stranded..... Geo. Garsford.	Part, \$2,000.

STATEMENT of wrecks and casualties reported as having occurred to British, Canadian and Foreign vessels in Canadian waters and to Canadian vessels in other waters, from January 1 to December 31, 1922—*Continued*

COASTING AND SEA-GOING WRECKS—*Continued*

Date of Casualty	Name of Ship Official No.	Age of Ship Years	Registered Port	How rigged Iron or wood Steam or sail	Register Tonnage	Port sailed from Port bound to	Place where Casualty happened	Particulars of Casualty Name of Master	Lives lost	Loss Total or Partial
Jan. 5	Dominion 116414	19	Vancouver	Schr. Wood. Steam.	10	Victoria, B.C. Gabriola.	Stewart Channel	Stranded. H. Lauder.		Part, \$165.
Jan. 26	Dauntless 111599	20	New Westminster	Tug Wood.	89-43	Ladysmith, B.C. Drury Inlet.	Off Nicoll's Island	Foundered F. J. D. Warren.	1	Total.
May 8	Dallas 217421	3	New York	Steam. Schr. Steel.	2,963	Boston Bergen, Norway.	Lat. 47° 52' N. Long. 49° 37' W. Newfoundland Banks.	Damaged by ice. A. Swendsen.		Part, \$8,000.
May 10	Dorothy Alexander 203813	15	Tacoma	Steam. Schr.	2,546	San Diego Victoria.	Rithel's Dock, B.C.	Collided with <i>Empress of Asia</i> . T. H. Cann.		Slight.
July 1	Diego 90834	27	Port Medway	Schr. Wood. Sail.	27	Halifax Jeddore, N.S.	Dickies Rock, N.S.	Stranded. J. Mitchell.		Total, \$800.
July 5	Diamond T. 216856	4	Ketchikan	Wood. Gas.	8	Ketchikan Prince Rupert.	Melta Kalta Bay	Stranded. J. F. Capp.		Part, \$120.
July 17	Doris L. Corkum 137855	6	Lunenburg, N.S.	Schr. Wood. Sail.	98-76	Lunenburg Fishing Grounds.	3 miles east of Cape Baidard, Nfld.	Stranded W. Walters		Total, \$25,000.
Sept. 12	Digges 133867	12	Vancouver	Tug Wood. Steam.	43-52	Vancouver Menzie Bay.	2 miles of Gower Point, Gulf of Georgia.	Collided with <i>Eta Mac</i> . H. Blackstad.		Part, \$500.
Oct. 20	Duan 92356	41	St. John, N.B.	Wood. Steam.	45	Jensey, N.B. St. John, N.B.	Near Gorham's Bluff	Foundered. C. W. McLean.	5	Part. Ship, \$2,000. Cargo, \$1,000. Part.
Nov. 1	Dorothy M. Smart 146874	12	Digby, N.S.	Schr. Wood. Sail.	94	Halifax Halifax.	Lat. 45° Long. 45° No. Atlantic.	Loss of sails. Jos. V. Bovina.		Total, \$6,000.
Feb. 6	E. M. Zellars 116506	18	Lunenburg, N.S.	Schr. Wood. Sail.	84	Kingston, Ja. Magna.	S.E. end of Magna	Stranded. W. Waller.		Total.
Mar. 15	Elizabeth D. 126807	11	Yarmouth, N.S.	Schr. Wood. Sail.	79	Bellorum, Nfld. Halifax.	Dog Island, St. Pierre Miquelon.	Foundered John Petit.		Total.
April 2	Esda 111782	39	New Westminster	Schr. Wood. Steam.	48-26	Vancouver Vancouver.	Jim Jack Island	Stranded Robt. Armstrong.		Part, \$3,000.
June 5	Eastern Prince 143071	6	Newcastle	Schr. Steel. Steam.	4,792-51	Seattle, Wash. Japan	Howe Sound, Queen Charlotte Channel.	Propeller damaged E. Naylor.		Part, \$1,200.

July 25	Etna	4	Christiania, Norway	Schr. Steel.	1,957-64	Blyth Chicoutimi.	Chicoutimi River.	Stranded. H. Kristophensen.	Part.
Aug. 12	Essex County 136767	7	Montreal	Steel. Steam.	2,228-64	Sydney Montreal.	Between Matane and Little Machins.	Stranding Wm. H. Venning.	Part, \$1,500.
Sept. 2	Fibergen	8	Rotterdam	Schr. Steel.	2,964-65	Montreal Emsden.	Off Batiscan Traverse, St. Lawrence River.	Stranded. W. H. de Jonge.	Part.
Sept. 3	Etta Mac 150649	5	Vancouver	Steam. F. & A. Wood.	47-96	Vancouver Vancouver.	Lat. 49° 21' N. Long. 123° 35' 30" W. Gulf of Georgia.	Collided with Digges. Geo. Ford.	Part. \$150.
Sept. 29	Empress 116309	17	Charlottetown, P.E.I	Motor. Schr.	1,342		Near Black Point, Bay of Fundy.	Stranded Andrew McDonald.	Part.
Oct. 5	Empress of Asia 135226	9	Vancouver	Steel. Steam.	8,883	Vancouver Hong Kong.	Victoria	Collided with Dorothy Alexander.	Part.
Oct. 18	E. A. Chisholm 94645	34	Lunenburg, N.S.	Schr. Wood.	78-03	North Sydney Charlottetown.	Hillsborough Bay	Stranded Wm. Malcolm.	Total.
Oct. 25	Evelyn V. Miller 126514	12	Lunenburg, N.S.	Schr. Sail.	98-91	Boston Yarmouth.	Yarmouth Harbour	Stranded Thos. Scott.	Part.
Oct. 23	Eleanor			Launch Gas.					
Dec. 6	E. C. E. No. 20	11	Vancouver	F. & A. Wood.	286	Boston Wolfville.	Entrance Booth Bay Hr. Me.	Stranded A. E. Tower.	Part, \$12,000.
Dec. 29	Ena F. Parsons 141077	2	Windsor, N.S.	Schr. Wood.	221	Parrsboro, N.S. Boston.	Lat. 43° 05' N. Long. 69° 33' W. No. Atlantic.	Damaged in gale. J. Llewelyn.	Part, Ship, \$300. Cargo, \$500.
Jan. 7	Frederick H. 141624	2	Parrsboro	Schr. Wood.	426	New York	Negro Point Breakwater, St. John Harbour.	Stranded F. G. Hawx.	Part.
Jan. 16	Frank J. Elkin 141221	4	Weymouth	Schr. Sail.	500	New York Yarmouth.		Loss of sails.	Part.
Nov. 18	Frontenac 107668	23	Quebec	Schr. Iron.	206	St. Cicholas, Que. Quebec.	Quebec Harbour	Collided with Calgaro- lite.	Part.
Dec. 12	Ferry No. 2 116784		Vancouver	2 msts. Wood.	370	North Vancouver North Vancouver.	Burrard Inlet, B.C.	Jos. Plante. Collided with Sonrisa. R. R. Spicer.	Part. \$2,500.
Jan. 22	Gladiator 86134	31	Bangor, Me.	Schr. Wood.	75	Rose Blanche, Nfld. Buckeport, Me.	North Atlantic	Damaged in gale. Wm. McKay.	Part, \$7,000.
Feb. 27	Gunner 132765	6	Plymouth	Schr. Sail.	108	Port Alice Ladysmith.	2½ cables from Blaney Wharf.	Stranded B. J. Tope.	Part.
May 8	Grand Desert 116731	18	Halifax	Steam. Schr.	65-44	Amherst, Magdalen Islands.	Bayfield, P.E.I.	Stranded G. Depire.	Total, \$3,000.
Aug. 22	Gray 124395	13	Workington	Wood. Sail.	280	Port Elgin, N.B. Victoria Union Bay.	Java Reef, Saturna Isl.	Stranded W. F. Bellington.	Part.
Sept. 30	Gerald Morgan 160727	29	Montreal	Schr. Steel.	59-85	Montreal Sorel.	East of Raisin Island, River St. Lawrence.	Collided with Cymric Queen. A. Brown.	Slight. 1

STATEMENT of wrecks and casualties reported as having occurred to British, Canadian and Foreign vessels in Canadian waters and to Canadian vessels in other waters, from January 1 to December 31, 1922—*Continued*

COASTING AND SEA-GOING WRECKS—*Continued*

Date of Casualty	Name of Ship Official No.	Age of Ship Years	Registered Port	How rigged Iron or wood Steam or sail	Regis- ter- Ton- nage	Port sailed from Port bound to	Place where Casualty happened	Particulars of Casualty Name of Master	Lives lost	Loss Total or Partial
Oct. 15...	Glenmoor 12601	16	London	Schr. Steel.	2,403	Dunstan-on-Tyne Montreal	Long Point Shoal. Montreal Harbour.	Stranded R. C. Collins.	.....	Slight.
Nov. 5...	Gaspesia. 144625	13	Dundee	Schr. Steel. Steam.	520	Montreal. Montreal.	Cape Cove, P.Q.	Stranded Wm. Tremblay.	.....	Part.
Nov. 25...	Grace Dollar. 142702	4	Hong Kong	Schr. Steel.	4,040	Vancouver. New York.	First Narrows, Van- couver.	Stranded. Jas. Tasker.	.....	No damage.
Nov. 29...	Gray. 124395	13	Workington, Eng.	Schr. Steel. Steam.	280	Victoria. Seattle.	Juan de Fuca Strait	Struck a log. W. F. Bellington.	.....	Part.
Dec. 1...	G. R. Crowe. 123324	14	Toronto	Schr. Steel.	2,347	New York. New York.	Lat. 23° 50' Long. 87° 20', Gulf of Mexico.	Sprang a leak. R. J. Green.	.....	Part.
Dec. 15...	Gladys E. Whidden 94944	18	Liverpool, N.S.	Schr. Wood.	107	Parrsboro. Boston.	Near Parrsboro.	Stranded.	.....	Part.
Dec. 22...	Gertrude D. C. Costa.	10	Boston	Schr. Wood.	61	Boston. Fishing banks.	Brown Banks, No. Atlantic.	Sprang a leak. A. Ferrara.	.....	Part, \$1,000.
Jan. 29...	Hiram D. Maclean. 141621	3	Parrsboro	Schr. Wood. Sail.	447	Liverpool, N.S. New York.	Between Liverpool and New York.	Loss of sails J. R. Livingston.	.....	Part, \$350.
April 11...	Hercules No. 7. 60359	13	London	Schr. Steel.	103	Victoria.	Victoria.	Stranded.	.....	Part, \$1,500.
July 18...	Hartney W. 116332	19	Parrsboro	Schr. Wood. Sail.	271	New York St. John, N.B.	Pollock's Rip Shoal, Mass.	Collided with <i>Frasch</i> . J. R. Pettis.	.....	Part.
Aug. 14...	Heaps.		Seattle	Sea-plane		Seattle. Victoria.	Clover Point.	Motor trouble E. Hubbard.	.....	Part, \$750.
Aug. 20...	Harry B. 80825	42	Charlottetown	Schr. Wood. Sail.	67	Sydney Charlottetown, P.E.I.	Toney River, N.S.	Foundered Wm. Malcolm.	.....	Total: Ship, \$1,000. Cargo, \$500.
June 8...	Igniger. 124212	15	Montreal	Schr. Steel.	830-49	Rock Bay, Que. Thorold.	1 mile above Lotbiniere	Stranded Ed. Groulx.	.....	Part, \$1,500.
June 24...	Iona. 107956	22	Charlottetown, P.E.I.	Schr. Wood. Sail.	98	Crapaud. Sydney, N.S.	Lennox Bridge, N.S.	Stranded J. Lord.	.....	Total: Ship, \$3,000. Cargo, \$600.

Aug. 11	Indochine 62802	28	Saigon	2 masts. Steel. Steam.	2,848	Haiphong. Montreal.	Opposite Three Rivers, St. Lawrence river.	Collided with <i>Sarmatia</i> . A. Ducamin.	Part
Sept. 22	Isle Perrot Ferry No 4 150722	4	Montreal	Ferry. Wood.	0-82	Isle Perrot. St. Ann, Que.	200 feet from St. Ann's shore.	Collided with <i>Argenteuil</i> .	Part, \$50.
Oct. 12	Izged	11	Ragusa	Gas. Schr.	2,705	Swansea, Eng. Montreal.	Off Cape Charles, St. Lawrence river.	Collided with <i>Orkild</i> . N. Dubnovitch.	Part, \$4,250.
Mar. 29	J. Scott. Hawkinson	1	Weymouth	Steel. Steam.	212	Weymouth Turk's Island.	Carlisle Bay, Barbadoes	Collided with <i>John R</i> <i>Penrose</i> . Art. Moore.	Part, \$111.
July 1	John B. Ketchum 130435	32	Montreal	Wood. Sail.	762-69	New York. Little Saguenay	½ mile from River Valin Range lights.	Stranded B. A. Sullivan.	Part.
April 27	Joyland 138108	6	Montreal	Schr. Steel.	1,070		Round Island, St Law- rence river.	Stranded.	Total.
Sept. 3	J. A. Mitchell	3	American	Wood. Schr.	319	Boston. Liverpool, N.S.	Gannet Rock ledge	Stranded. W. S. Roberts.	Part.
Feb. 18	Kathleen Spindler 141682	2	Lunenburg, N.S.	Wood. Sail.	112	Turks Island. Lunenburg.	Lat. 34° 12' N Long. 68° 30' W., No. Atlantic.	Abandoned Alvin Spindler.	Total, \$2,000.
Nov. —	K. & W. No. 8 130796	14	Vancouver	Schr. Wood.	96-60	Vancouver. New Westminster.	North arm Fraser river, B.C.	Foundered	Part, \$1,800.
Mar. 8	Lord Osmonde 110516	3	Quebec	Schr. Steel.	2,533	London. New York.	Lat. 49° N., Long. 14° 11' W., No. Atlantic.	Sprang a leak. Robt. Girvan.	Slight.
April 4	Lucy A.	19	Yarmouth, N.S.	Schr. Steam.	31-63	Yarmouth. Yarmouth.	3¼ miles W. from Cape Forchu, Bay of Fundy.	Foundered. John Sims.	Total: Ship, \$20,000. Cargo, \$2,000. Total, \$5,000.
May 2	L. A. D. 134566	8	New Westminster	Wood. Gas.	16	Vancouver Fraser River.	False Creek, B.C.	Burnt R. McCoy.	
May 28	Long Sault 126823	11	Quebec	Tug. Wood.	27-81	Montreal. Quebec.	Three Rivers, Que.	Collided with <i>Mina Bra</i> Wm. Allison.	Slight.
June 1	Loren B. Snow 121816	16	Yarmouth, N.S.	Schr. Wood.	75-83	Yarmouth, N.S. Fishing grounds.	25 miles W. of Cape Fouchu, Bay of Fundy.	Foundered Louis Leblanc.	Total.
June 13	Lucile B.		Weymouth, N.S.	Gas. Schr.	55	St. John, N.B. St. Pierre Miquelon.	North entrance Canso Harbour.	Stranded W. I. Comeau.	Slight.
Sept. 16	Lake George 2486	5	Bay City	Wood. Gas.	1,782	Philadelphia Washburn, Wis.	Indian Island, N.S.	Stranded B. J. Sloan.	Part.
Nov. 17	Louis Joseph 126931	11	Quebec	Steel. Steam.	37-60	Chicoutimi Terres-Rompues.	4 miles ahead of Chicou- timi.	Stranded. E. Gagnon.	Part, \$2,000.
Jan. 13	Memominee 108688	26	Glasgow	Schr. Wood.	4,441		Halifax Harbour	Stranded	No damage.
Feb. 6 to 14	Marion G. Douglas. 133890	5	Lahave, N.S.	Schr. Wood. Sail.	779	Liverpool, N.S. Sydney.	Lat. 30° 28' N Long. 78° 29' W., off Cape Henry, U.S.A.	Damaged in gale S. Peldent.	Part.

STATEMENT of wrecks and casualties reported as having occurred to British, Canadian and Foreign vessels in Canadian waters and to Canadian vessels in other waters, from January 1 to December 31, 1922—Continued

COASTING AND SEA-GOING WRECKS—Continued

Date of Casualty	Name of Ship Official No.	Age of Ship Years	Registered Port	How rigged Iron or wood Steam or sail	Register Tonnage	Port sailed from Port bound to	Place where Casualty happened	Particulars of Casualty Name of Master	Lives lost	Loss Total or Partial
Feb. 24...	M. T. Co. No. 1.....	22	Vancouver.....	Tug..... Wood. Steam.	1,365	Vancouver Vancouver.	Vancouver Harbour.....	Damaged by fire..... A. M. Snider.	.....	Part, \$3,000.
April 24...	Mapledawn..... 141836	2	Montreal.....	Schr..... Steel.	1,333.21	Halifax Montreal.	Isle de l'Aigle, St. Lawrence river.	Stranded..... J. P. Dufour.	.....	Slight.
May 4...	Merrymount..... 209074	3	Groton, Conn.....	Schr..... Iron. Steam.	3,476	Boston Montreal.	Montreal Harbour.....	Collided with Canadian Sapper.	.....	Part, \$4,200.
May 19...	M. A. Ellis.....									
May 27...	Manon L..... 150283	1	Sorel.....	Barge Steel. Sail.	250.87	Montreal Quebec.	Off Cape Dolphin Three Rivers.....	Stranded..... Collided with Mina Brae E. Thibaudeau.	.....	Part. Part.
June 2...	Montcalm..... 145903	1	Liverpool.....	Schr..... Steel. Steam.	9,789	Liverpool Liverpool.	Bigot point, St. Lawrence river.	Stranded..... Alex. Rennie.	.....	Slight.
June 23...	Mary Battle..... 94911	4	Montreal.....	..... Wood. Steam.	187	.....	Off Cape Rosier.....	Stranded.....	.....	Total.
July 10...	M. D. B. No. 2..... 141535	2	Vancouver.....	Schr..... Wood. Sail.	239	Vancouver Vancouver.	Fel's Fill, No. Vancouver.	Bottom damaged.....	.....	Part, \$600.
Aug. 6...	Manchester Corporation. 108844	22	Manchester.....	Schr..... Steel. Steam.	3,479	Manchester Montreal.	Lat. 51° 36' N..... Long. 56° 13' W. Strait of Belle Isle.	Collided with iceberg J. A. Everet.	.....	Part.
Sept. 4...	Maid of Canada..... 141137	4	Lahave, N.S.....	Schr..... Wood. Sail.	330	Perth Amboy Halifax.	Off Sambro light.....	Collided with Sadie Mack. J. B. Wilkie.	.....	Part.
Oct. 4...	Mathilda..... 107416	23	Montreal.....	Schr..... Steel. Steam.	68.72	Montreal.....	Montreal Harbour.....	Collided with Merope. M. Latraverse.	.....	Slight.
Oct. 4...	Merope.....		Syria, Greece.....	Schr..... Steel. Steam.	2,780	Hull, Eng.....	Montreal Harbour.....	Collided with Sir Hugh Allan. A. Calafatis.	.....	Part.
Oct. 11...	Marshall Foch.....	5	Gloucester, Mass.....	Schr..... Wood. Sail.	64	Gloucester..... Fishing grounds.	Sable Island.....	Stranded..... Jas. Whittle.	.....	Total.
Oct. 11...	Mongibello.....	22	Naples.....	2 masts Steel. Steam.	2,226	Livonia Montreal.	Anticosti Island.....	Stranded..... V. Mano.	Part.

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Oct. 17.	Modica	2	Christiania, Norway.	Schr.	2,648	Blyth, Eng. Montreal.	Long Point, Montreal Harbour.	Stranded. L. M. Jensen.	Slight.
Oct. 29.	Masset 141173	5	New Westminster.	Steel. Steam.	91	Sedwick Bay.	Hecate Strait.	Damaged in gale. H. H. Robinson.	Part, \$2,000.
Nov. 11.	Manoa 143208	10	London	Wood. Steam.	3,181	St. Johns, Nfld. Montreal.	7 miles from Fame Point	Stranded A. H. H. Waterlow.	Part, \$2,000.
Nov. 17.	Malabar 94775	34	Charlottetown, P.E.I.	Schr. Steel.	93	Summerside, P.E.I. Sydney.	Port Hawkesbury, N.S.	Stranded. D. Miller.	Part. Ship, \$300. Cargo, \$300.
Nov. 20.	Montrolite 150708	4	Montreal	Wood. Sail.	3,997	Montreal. Campano, Arg.	River Plate, Arg.	Stranded W. R. Smeltzer.	Slight.
Nov. 21.	Martha Parsons 141072	5	Windsor, N.S.	Schr. Steel.	455	Philadelphia. Martinique.	Lat. 34° 52' No. Atlantic.	Sprang a leak J. W. Hughes.	Part.
Dec. 23.	Mollie G. 1147	7	Victoria	Wood. Gas.	65	Victoria. Victoria.	Straits of Georgia.	Burnt A. Knowles.	Total.
Dec. 22.	Maid of England 141573	3	Weymouth	Atne. Wood.	696	St. Marc, Haiti Baltimore.	Lat. 34-30' N., Long. 74-50 W., N. Atlantic.	Loss of sails and cargo. C. A. Arkle.	Part, \$1,000.
Dec. 28.	Madone V	32	Halifax	Schr. Wood.	89	Halifax St. Pierre-Miquelon.	Near Long Island, South coast.	Stranded. Geo. James.	Total.
April 24.	Mc B. No. 3 133717	10	Vancouver	Sail. Wood.	147-86	Vancouver Vancouver.	English Bay, Gulf of Georgia.	Took a list F. A. Slawson.	Part. Cargo, \$550.
May 12.	North Shore 144929	26	Quebec	Schr. Steel. Steam.	532-32	Quebec. Natashquan.	½ mile from Clear Water Point, Canada.	Stranded J. Bouheer.	Part, \$5,000.
May 15.	Nervier						Off South Traverse Lightship, St. Lawrence River.	Stranded	Part.
Aug. 27.	Nosredna 150264	3	Vancouver	Wood. Gas.	20	Sydney, B.C. Everett, Wash.	San Juan Island, U.S.A.	Stranded M. Pike.	Part.
Sept. 2.	Nellie King. 103800	22	Shelburne, N.S.	Schr. Wood.	99	Buctouche, N.B. Boston.	11½ miles S.E. of Sam- bro Light.	Collided with <i>Corinthian</i> W. L. Murray.	Part, \$200.
Sept. 21.	Nellie Dixon 133789	33	St. Andrews, N.B.	Schr. Sail.	71-46	Belize, Br. Honduras. Nassau.	Lat. 26. 1', Long. 83. 4' Gulf of Mexico.	Damaged in gale F. A. Peters	Part, \$1,500.
Nov. 14.	North Vancouver Ferry No. 2.	18	Vancouver	Wood. Sail. Ferry. Steam.	370	North Vancouver	Burrard Inlet, B.C.	Collided with <i>Admiral</i> <i>Schley</i> .	Part, \$2,500.
Dec. 28.	Nellie J. Banks 126653	13	Shelburne, N.S.	Schr. Wood. Sail.	35	Lockeport Fishing grounds.	Lockeport Harbour	Collided with wharf B. Mackenzie.	Part, \$1,500
July 4.	Orithia	26	Glasgow	Schr. Steam. Steel.	2,694	Avonmouth.	2 miles of White Island,	Collided with <i>Airdale</i> .	Part.
Oct. 12.	Orkald	16	Copenhagen	Schr. Steel. Steam.	1,178	Montreal. Philadelphia. Montreal.	St. Lawrence river. Off Cape St. Charles, St. Lawrence river.	Geo. P. Pearson. Collided with <i>Izled</i> .	Part, \$10,850.

STATEMENT of wrecks and casualties reported as having occurred to British, Canadian and Foreign vessels in Canadian waters and to Canadian vessels in other waters, from January 1 to December 31, 1922—*Continued*

COASTING AND SEA-GOING WRECKS—*Continued*

Date of Casualty	Name of Ship Official No.	Age of Ship Years	Registered Port	How rigged Iron or wood Steam or sail	Register Ton- nage	Port sailed from Port bound to	Place where Casualty happened	Particulars of Casualty Name of Master	Lives lost	Loss Total or Partial
Jan. 7...	Pachena 140950	3	Prince Rupert	Wood. Steam.	21-63	Prince Rupert Prince Rupert.	Between Stewart and Prince Rupert.	Stranded Chas. Flenickson.	.....	Part, \$60,00.
Jan. 13...	Princess Mary 126950	11	Victoria	Schr. Steam. Steam.	1,346	Vancouver Vancouver.	First Narrows, Van....	Collided with <i>Wakenat</i> C. C. Sainty.	.....	Part, \$750.
Jan. 15...	Princess Royal 121988	15	Victoria	Schr. Wood. Steam.	981	Vancouver Victoria	Yutside 1st Narrows, Vancouver.	Collided with <i>Clinton</i> Thos. Rippon.	.....	Slight
Jan. 15...	P.G.E. No. 1 140989	.....	New Westminster	Barge Wood.	651	Vancouver Vancouver.	Entrance to 1st Narrows Vancouver.	Collided with unknown vessel.	.....	Part.
Feb. 24...	P.G.E. No. 1 140989	.....	New Westminster	Barge Wood.	651	Vancouver Squamish.	Howe Sound, B.C.	A. J. McAskill Foundered L. H. Fraser.	.....	Part, \$3,250.
Mar. 30...	Patrick & Michael 141651	2	Yarmouth, N.S.	Schr. Wood. Gas.	119-48	Yarmouth	65' S.E. by S. from Cape Roseway.	Collided with <i>E. C.</i> <i>Adams</i>.	.....	Part, \$3,500.
July 22...	Parima 96643	32	Montreal	Schr. Steel. Steam.	1,875	New York Boston.	Off Quarantine Station, Station, Slater Island	Damaged by fire P. J. McComb.	.....	Part.
Aug. 4...	Princess Beatrice 116405	19	Victoria	Schr. Wood.	635	Vancouver Prince Rupert.	Tolmie Channel, B.C.	Shaft broken A. Thomson.	.....	Part.
Aug. 25...	Princess Beatrice 116405	19	Victoria	Schr. Wood. Ste.	635	Vancouver Prince Rupert.	Skeena River.	Stranded A. Thomson.	.....	Part, \$6,000.
Sept. 17...	Princess Ena 122387	15	Victoria	Schr. Steel. Steam.	827	Vancouver Thane, Aaa.	Gastineau channel, Aaa.	Collided with <i>Grace E.</i> W.	.....	Part.
Oct. 24...	Prince Arthur 110131	23	Yarmouth	Schr. Steel.	923	Yarmouth Boston.	Yarmouth harbour	Thos. Cliffe. Collided with <i>La Cana-</i> <i>dienne</i>.	.....	Part.
Nov. 11...	Princess Mary 133769	9	Victoria	F. & A. Steel. Steam.	918-60	Victoria Cachalot, B.C.	Cochalot, B.C.	F. R. Crosby. Stranded Eddw. Gillan	.....	Part.
Nov. 13...	Princess Adelaide 126948	12	Victoria	Schr. Steel. Steam.	1,910	Victoria Vancouver.	Vancouver	Collided with <i>Charmers</i> R. A. Hunter.	Part, \$450.

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Nov 13	Princess Adelaide. 126948	12	Victoria	Schr. Steel.	1,910	Victoria. Victoria.	First Narrows, Van.	Collided with <i>Shobokan</i>	Part.
Nov 22	Prince George 129748	12	Newcastle.	Schr. Steel.	1,625	Seattle, Wash. Prince Rupert.	Graham Reach.	Struck log W. S. Morehouse.	Part.
Dec. 2	Prince Arthur. 113101	23	Yarmouth.	Schr. Steel.	923	Yarmouth Boston.	Lat. 43-23' Long. 69-00' Gulf of Mexico.	Damaged in gale F. K. Crosby.	Part.
Dec. 9	Pictonian 138609	1	Pictou	Schr. Steel.	202	Pictou Lunenburg.	Entrance to Port Hawkesbury.	Stranded J. B. Wikie.	Part, \$500.
Sept. 16	Queen 20587	41	Tacoma	Iron Steam.	1,672	Seattle, Wash. Seattle, Wash.	White Cliff Island, Arthur passage.	Foundered C. A. Glascock.	Part.
Oct 30	Quinnet 126437	13	Vancouver	Wood. Gas.	1,103	Vancouver Deep Cove, B.C.	Burrard inlet.	Collided with <i>Centre Star</i> .	Part, \$25,000.
Jan. 3	Ruby L. Pentz 141286	3	Lahave, N.S.	Schr. Wood.	133	Lahave, N.S.	Lat. 30 30', Long. 67-47' N. Atlantic.	Wm. Grosenthwaite. Abandoned. H. Himmelman.	Total, \$25,000.
Sept. 26	Rambler 56868	23	Rouses Point	Canal boat Wood.	99	Rouses Point. Quebec.	Off Portneuf, St. Lawrence river.	Collided with <i>M. W. Walters</i> .	Part, \$50.
Nov 7	Ralph 90593	3	Lunenburg, N.S.	Schr. Wood.	51-41	Buctouche, N.B. Newcastle, N.B.	North Atlantic.	A. Senechal. Missing Alex. Wry.	3 Total.
Dec. 21	Ronald M. Douglas. 143027	1	St. Johns, Nfld.	Schr. Wood	189	Gaultois, Nfld. Gaultois, Nfld.	Canaille Rock, St. Pierre-Miquelon.	Stranded Thos. Douglas.	Part.
Dec. 26	Rainbow. 134633	10	Victoria	Barge Wood.	61-14	Nanaimo Protection island.	Nanaimo harbour.	Collided with <i>W. Evans Colman</i> and <i>Light Scow No. 20</i> . Daniel Martin. Stranded T. R. Pickwell.	Slight.
Jan. 16	Sea Foam 121739	16	Vancouver	Tug. Wood. Gas.	11-83	False Creek, N.B. Vancouver.	1/2 mile E. of Ambleside wharf	Stranded Thos. D. Martin.	Part, \$300.
Jan. 24	Shannon 83199	36	Halifax	Schr. Wood. Steam.	51	Halifax Halifax.	Pennant Point, N.S.	Stranded Thos. D. Martin.	Total, \$20,000.
Mar. 19	Scotsburn 126969	12	Halifax	Schr. Wood. Steam.	119	Halifax Lynn, Mass.	Lat. 43-20' N, Long 66-45' N. Atlantic.	Foundered Gordon Weston.	Total. Ship, \$40,000; cargo, \$4,000. Part.
April 16	Sadie. 100497	30	Victoria	Scow. Wood	34	Victoria Bamberton	Nanaimo harbour.	Collided with launch. J. H. Cole	Part.
April 28	Senator Derbyshire. 112351	5	Montreal	Schr. Wood.	987	Port-au-Saumon Montreal.	Isle-a-l'Aigle.	Stranded Jean B. Gamache.	Part, \$2,000.
May 7	Scotia No. 1	21	Ottawa	Schr. Steam.	568	Tormentine Port Borden, P.E.I.	Carleton Point, P.E.I.	Stranded J. N. McKinnon.	Slight.
May 8	Strathcona 111407	22	Lunenburg, N.S.	Schr. Steel.	88-60	Halifax Port Hawkesbury.	Bull Rocks. Fishermen's Harbour, N.S.	Foundered D. Morrissey.	Total.
June 8	Soluna		(Italian)	Steam.			Near Heath point.	Stranded	Part.

STATEMENT of wrecks and casualties reported as having occurred to British, Canadian and Foreign vessels in Canadian waters and to Canadian vessels in other waters, from January 1 to December 31, 1922—*Continued*

COASTING AND SEA-GOING WRECKS—*Concluded*

Date of Casualty	Name of Ship Official No.	Age of Ship Years	Registered Port	How rigged Iron or wood Steam or sail	Register Tonnage	Port sailed from Port bound to	Place where Casualty happened	Particulars of Casualty Name of Master	Lives lost	Loss Total or Partial
July 1...	Spray.....	29	Montreal.....	Steel..... Steam.	59.85	Montreal..... Sorel.	About 4½ miles above Sorel.	Collided with <i>Cairndhu</i> N. Mongeau.	.....	Part, \$50,000.
July 6...	Sangstad.....	12	Christiania Norway.	Fore & Aft. Steel.	1,459	St. John, N.B. Halifax.	Seal island, N.S.....	Stranded..... W. Wormsen.	.....	Part, \$12,000.
Aug. 11...	Sarmatia..... 72555	21	Copenhagen.....	Steam. Schr.....	1,438	Montreal..... Sydney.	Three Rivers banks....	Collided with <i>Indochine</i> L. Buck.	.....	Part, \$40,000.
Sept. 4...	Sadie Mac..... 150295	5	Sydney, N.S.....	Schr..... Wood.	34	Lunenburg..... Boston.	15 miles S.W. of Sambre Light.	Collided with <i>Maid of Canada</i> . John Petit.	.....	Part, \$300.
Sept. 27...	Spilsby..... 124277	13	Stockton.....	Steam. Schr.....	2,254	.....	Off St. Nicholas wharf, St. Lawrence river.	Collided with <i>Sinasta</i>.....	.....	Part,
Sept. 28...	Senator Derbyshire. 112351	5	Montreal.....	Steam. Wood.	987	Salmon Bay, Saguenay River.	Opposite Ile-aux-Vaches.	Stranded..... J. B. Gamache.	.....	Part.
Sept. 29...	Scotia Maiden..... 141224	3	Weymouth.....	Steam. Schr.....	400	Ogdensburg. St. John, N.B. Marseilles.	Lat. 41° 40' N Long. 5° 08' E. Gulf of Lyons.	Crank shaft broken..... C. J. R. Kohles.	.....	Part.
Sept. 30...	S.O. Co. No. 41..... 116952	17	Sarnia, Ont.....	Motor. Steel.	481	Montreal..... Quebec.	2nd buoy to E. of Raisin Island, Lake St. Peter.	Collided with <i>Cymric Queen</i> . C. Harmonson.	.....	Part, \$6,300.
Oct. 6...	Sir Hugh Allan..... 150534	11	Montreal.....	Sail. Schr.....	10.37	Montreal..... Montreal.	Montreal Harbour.....	Stranded..... X. Laviolette.	.....	Slight.
Dec. 5...	Sinnac..... 140968	4	Montreal.....	Steel. Steam.	60.92	Quebec Montreal.	Off Champlain River ..	Stranded..... P. Bibeau.	.....	Slight.
Dec. 12...	Somrisa..... 133877	9	Vancouver ..	Wood. Steam.	.....	.....	.....	Collided with <i>Ferry No 2</i> . Rudder trouble.	.....	Part, \$160.
Jan. 23...	Thyra..... 5922	4	Hensborg Sweden.	Gas. Schr.....	1,574	Tampa, Fla..... Helsborg.	Lat. 72° 48' N Long. 51° 40' W. No. Atlantic.	Rudder trouble..... R. H. Anderson.	.....	Part, \$12,000.
Mar. 23...	Teager	16	Gloucester, Mass....	Steel. Schr.....	57	Gloucester .. Fishing Grounds.	Brown's Banks..... No. Atlantic.	Sprang a leak..... H. Mason.	.....	Part, \$3,000.
April 29...	Tararalite.....	5	Sarnia, Ont.....	Wood. Gas. Schr.....	1,304.72	Vancouver .. Montreal.	Gut of Canso, N.S.....	Damaged by fire..... F. F. Foote.	Part, \$15,000.

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June 9...	Thistle 107867	20	Dawson, Y.T.	Wood. Steam.	152-83	White Horse, Y.T. Mayo, Y.T.	Macauley Creek Yukon River.	Stranded H. Breaden.	Part cargo, \$400.
July 24...	Tyrrenia						West of Three Rivers, St. Lawrence River.	Fouled aerial transmis- sion lines of Shawini- gan & Power Co. Burnt. Y. Hamagami.	Part.
Aug. 7...	Tashmo 141554	3	Vancouver.	Wood. Gas.	18-01	Vancouver Vancouver.	Kingcome Inlet, B.C.	Stranded A. G. Cameron.	Total, \$7,000.
Sept. 23...	Trontolite	4	Toronto	Schr. Steel.	5,267	New York Tampico, Mex.	Pamico River Tampico.	Stranded A. G. Cameron.	Part, \$10,000.
Jan. 17...	Vigilant 111594		Vancouver	Tug Wood.	20	Vancouver False Creek.	North Vancouver	Collided with wharf Robt. Bailey.	Slight.
Sept. 18...	Venture 129475	12	Victoria	Steam. Schr.	580	Vancouver Beaver Cove.	Beaver Cove, B.C.	Stranded A. Johnstone.	Part, \$5,500.
Dec. 12...	Venture 129475	12	Victoria	Steam. Schr.	580	Vancouver Prince Rupert.	Cassiar Cannery	Stranded A. Johnstone.	Part, \$5,000.
Dec. 6...	Victoria 111409	22	Lunenburg, N.S.	Steam. Schr.	99-86	County Harbour, N.S. Sheet Harbour, N.S.	Sheet Harbour	Stranded R. N. Robinson.	Total.
Dec. 26...	V.I.T. No. 1 130608	11	Victoria	Sail. Barge.	193	Victoria Clam Bay, B.C.	Enterprise Channel, B.C.	Stranded L. Thomson.	Part.
Dec. 27...	Venture 129475	12	Victoria	Wood. Schr.	580	Vancouver Ocean Falls.	Swanson Bay	Struck submerged rock A. Johnstone.	Part.
Jan. 4...	W. H. Smith 130824	10	Lunenburg, N.S.	Steel. Steam.	93-70	Lunenburg Nassau.	Nassau, Bahamas.	Stranded Y. Wnetzen.	Total, \$12,000.
Jan. 6...	Winnifred	17	St. Johns, Nfld	Schr. Wood.	99	Bonne Bay, Nfld Gibraltar.	Gibraltar Bay	Stranded E. T. Hobbs.	Part.
Jan. 11...	West Vancouver.	8	Vancouver	Sail. Wood.	48-51	Vancouver West Vancouver.	West Vancouver	Stranded R. W. Partington.	Part, \$1,348.
Jan. 13...	Wakana 208632	11	Seattle Was	Wood. Gas.	316	Seattle Seattle.	Vancouver Narrows	Collided with <i>Princess Mary</i> . C. A. Woodley.	Part, \$3,504.
Mar. 15...	Wm. S. McDonald 141776	2	LaHave, N.S.	Schr. Wood.	251-89	Halifax	Lat. 32-10' N Long. 65-14' W. No. Atlantic.	Sprang a leak A. Parks.	Part.
May 7...	W. H. Libby 220651	15	Bayonne, N.J.	Sail. Schr.	5,934	Montreal Montreal.	200 ft. of La Force Gas Buoy, St. Lawrence River.	Stranded T. Thomson.	Part.
July 2...	Win-the-War 138192	4	LaHave, N.S.	Steam. Schr.	149-18	Digby, N.S. Lunenburg, N.S.	Bon Portage Isld., N.S.	Stranded W. E. Ryder.	Total, \$10,000.
Aug. 28...	Walbash 21554	22	Wilmington, Dela.	Wood. Sail.	3,312	Seattle, Wash. Gray Harbour, Wash	Otter Point, Van.	Stranded A. H. Pitre.	Slight.
Dec. 13...	West Hardaway 217708	4	Portland, Ore	Schr. Steel.	5,771	Mobile, Ala. Mobile, Ala.	Lat. 42-26' N Long. 51-41' W.	Stranded F. H. Saunders.	Slight.

STATEMENT of wrecks and casualties reported as having occurred to British, Canadian and Foreign vessels in Canadian waters and to Canadian vessels in other waters, from January 1 to December 31, 1922—(Continued)

INLAND WATERS—WRECKS.

Date of Casualty	Name of Ship Official No.	Age of Ship Years	Registered Port	How rigged Iron or wood Steam or sail	Register Tonnage	Port sailed from Port bound to	Place where Casualty happened	Particulars of Casualty Name of Master	Lives lost	Loss Total or Partial
May 10.	Annie Moiles. 90851	57	Sarnia, Ont.	Schr. Wood.	48-61	Detroit, Mich. Sarnia, Ont.	500 ft. above Tashma Park Dock.	Collided with <i>J. T. Hutchison</i> , E. J. Cadotte. Disabled.		Part, \$10,000.
Oct. 12	Areturus 110025	24	London	Barge. Wood.	116		Middle of Channel of Manacjuda Isld.			Part.
Nov. 18	Bayusona 140405	20	Montreal	Barge. Steel.	795		Between Locks 1 and 2, Lachine Canal.	Collided with barge <i>Frank D. Euen</i> . J. Martin. Stranded.		Part.
April 17.	Canadian 125427	16	Montreal	Schr. Steel	1,444	Midland, Ont.	Giant's Tomb	H. A. Patterson.		Part.
Nov. 18.	City of Dresden.	35	Windsor	Schr. Wood.	115	Amherstburg, Ont. Port Huron, Mich.	15 miles E. of Port Bur- well, Lake Erie, Can- ada.	Stranded. J. S. McQueen.		Total ship, \$20,000.
July 28	Caribou 116249	22	Sault Ste. Marie	Schr. Wood.	371		Nelson Channel, near Richard's Landing.	Stranded.		Cargo, \$20,000 Part.
Dec. 16	Emperor 126654		Midland, Ont.	Schr. Steel.	4,641		Bar Point	Stranded P. W. Burke.		Part.
Jan. 22.	Ferdinand. 122221	3	Prescott, Ont.	Schr. Wood.	48	Prescott.	Near Ogdensburg	Stranded.		Slight.
July 11.	Franz. 88957	53	Melbourne	Bne. Sail.	232		Off Valley Camp Coal Dock, Detour.	Collided with <i>Shenango</i>		Part.
May 8	Glenmavis. 133533	9	Midland	Schr. Steel.	1,055	Port Colborne Montreal.	1 mile E. of Port Col- borne.	Collided with <i>Keweenaw</i> A. G. McKay.		Part, \$5,000.
May 18	Glenfinnan 126659	29	Midland	Schr. Steel.	1,471-91	Fort William	Lake Superior	Collided with <i>Midland</i> J. N. Foote.		Part.
July 28.	Glenfinnan 126659	29	Midland	Schr. Steel.	1,471-91	Fort William Port Colborne.	Soo River, Canada	Stranded Wm. Taylor.		Part.
July 28.	Glenbrea. 138217	32	Midland	Schr. Steel.	1,422-96	Fort William Midland.	Sault Ste. Marie Chan- nel.	Stranded Percy Beatty.		
Nov. 11.	Glenisle 138214	4	Midland	Schr. Steel	3,404		4 miles outside White- fish Point.	Stranded		Part.

July 16	Huronton 141664	2	Toronto	Schr. Steel.	1,242	Port Colborne Montreal.	1/4 mile N. of McGee's Light, Lake St. Louis.	Stranded W. Beatty.	Slight.
May 8	Iocoma 132745	10	Sarnia	Schr. Steam.	1,035	Sarnia Sarnia.	3 miles S. of Welland Canal.	Collided with <i>Terrisa</i> T. A. McMann.	Part, \$300.
July 19	Imperoyal 135209	9	Sarnia	Schr. Steel.	1,384	Collingwood Sarnia.	Collingwood Harbour	Striking obstruction. H. C. Minnis.	Part.
April 27	Joyland 138108	6	Montreal	Schr. Wood.	1,070		3 miles E. of Clayton	Stranded	Total.
May 9	Keywest 125458	13	Newcastle-on-Tyne	Schr. Steam.	1,298	Montreal Port Colborne.	Welland Canal.	Collided with <i>Glenmaris</i> W. A. Davis.	Part, \$5,000.
May 27	Keyvive 127830	9	Middleborough, Eng	Schr. Steel.	1,045	Port Colborne Montreal.	Welland Canal.	Collided with <i>Navagho</i> E. J. Smith.	Part, \$3,000.
Aug. 29	Kearsage	28	Duluth	Schr. Steel.	2,721	Milwaukee Depot Harbour.	Yeo Island, Georgian Bay.	Stranded, E. Jaenk.	Part, \$30,000.
Nov 21	Laurentia 126485	13	Montreal	Schr. Wood.	204-88	Montreal Valleyfield.	Soulanges Canal	Collided with <i>Corunna</i> J. O. Sicotte.	Part.
April 27	Mapleheath 129767	2	Kingston	Schr. Steel.	1,036	Port Colborne Montreal.	Entrance Lachine Canal	Collided with Lock No. 1. E. Walkinshaw	Part, 43,000.
May 18	Midland King 116661	19	Midland	Schr. Steel.	2,450-49	Port McNicholl Fort William.	70 miles S. 58 E. of Pas- sage Island, Lake Su- perior.	Collided with <i>Glenfinnan</i> A. T. Pyette.	Part, \$20,000.
June 11	Malton 130439	34	Sarnia, Ont	Schr. Steel.	987-85	Port Colborne Montreal.	Between Locks 25 and 26 Welland Canal.	Collided with <i>Hamilton</i> J. A. Smith.	Part, \$500.
Aug. 31	Maplebrook 121784	16	Ottawa	Steam. Iron.	864	Montreal	Fort William	Damaged by fire.	Part.
Oct. 7	M. D. Mathews 116264	19	Toronto	Steel. Steam.	2,450	Fort William Port McNicoll.	N.W. Bank, Lake Huron	Stranded A. F. McLennan.	Part.
Nov. 28	Marquette and Besse- mer. 200537	19	Buffalo, N.Y	Steel. Steam.	998	South Chicago Montreal.	Lake St. Francis St. Lawrence River.	Stranded M. Peterson.	Part.
Nov. 30	Maplehurst 138230	30	Montreal	Schr. Steel.	732	Lorain Port Arthur.	Western entrance, Port age Ship Canal, Mich.	Foundered. N. Ménard.	Total, \$122,000
Nov. 18	Maisonneuve 100658	38	Ottawa	Tug Wood.	18	Cascades Point	Foot of Lock No. 1, Sou- langes Canal.	Burnt	Total, \$6,000.
July 13	Noronie 134014	9	Port Arthur	Schr. Steel.	3,936-66	Sarnia, Ont Sarnia, Ont.	St. Mary's River.	Stranded A. M. Wright.	Part.
Nov. 18	Ottawa 107736	34	Montreal	Dredge Wood.	129-60	Cascades Point	Cascades Point	Burnt	Total, \$8,000.
July 30	Rapids Prince 130118	12	Montreal	Schr. Steel.	955-11	Prescott Montreal.	Lachine Rapids, St. Lawrence River.	Stranded S. Putnam.	Part.

STATEMENT of wrecks and casualties reported as having occurred to British, Canadian and Foreign vessels in Canadian waters and to Canadian vessels in other waters, from January 1, to December 31, 1922—*Concluded*

INLAND WATERS—WRECKS—*Concluded*

Date of Casualty	Name of Ship Official No.	Age of Ship Years	Registered Port	How rigged Iron or wood Steam or sail	Register- Ton- nage	Port sailed from Port bound to	Place where Casualty happened	Particulars of Casualty Name of Master	Lives lost	Loss Total or Partial
Sept. 20.	Robert L. Fryer..... 134017	34	Port Arthur.....	Schr. Wood. Steam.	1,151-53	Port Arthur Port William.	Kamustiquia River....	Collided with <i>Pontiac</i> . A. J. Hogue.	.....	Part.
Sept. 27.	Rescue..... 88244	36	Port Arthur.....	Wood. Steam.	35-36	Chippawa..... Chippawa.	Niagara River.....	Foundered..... Jas. Grant.	.....	Part.
Nov. 4.	Richard W..... 133965	12	Montreal.....	Steel. Steam.	904-53	Montreal Montreal.	Buffalo River.....	Stranded..... J. B. Haymond.	.....	Part, \$3,000.
Dec. —	Reliance..... 11795	30	Sault Ste. Marie...	Tug. Wood. Steam.	181	Gargantua..... Soo.	Rowe Island, Lake Su- perior.	Stranded..... D. A. Williams.	3	Part, \$30,000.
April 28.	Senator Derbyshire. 112351	25	Montreal.....	Schr..... Wood. Steam.	987	Port Colborne Montreal.	Port Dalhousie.....	Collided with wharf....	.....	Part, \$300.
May 27.	Senator Derbyshire. 112351	25	Montreal.....	Schr..... Wood. Steam.	987	Montreal Port Colborne.	Lock No. 18, Cornwall Canal.	Collided with <i>Park S.</i> <i>Foster</i>.	.....	Part, \$1,000.
Oct. 21.	Saskatoon..... 123965	12	Montreal.....	Schr..... Steel. Steam.	1,447-89	Montreal.....	Lachine Canal.....	Collided with gate..... L. J. Patenaude.	.....	Slight.
May 4.	Trevisa..... 133573	7	Montreal.....	Schr..... Steel. Steam.	1,094-84	Buffalo Montreal.	Welland Canal.....	Collided with <i>Iocomo</i> . P. D. Mahoney.	.....	Part, \$10,000.
Oct. 9.	Turret Crown..... 104279	27	Montreal.....	Schr..... Steel. Steam.	1,150	Fort William Port McNicoll.	Methodist Island.....	Stranded..... Jas. E. Mann.	.....	Part.
Dec. 14.	Thunder Bay..... 131060	3	Montreal.....	Iron. Steam.	1,109	Ashtabula..... Port Colborne.	Morgan's Point..... Lake Erie.	Stranded..... W. A. Blackwell.	.....	Part.
Jan. 11.	W. E. Franz..... 130775	21	Sault Ste. Marie.....	Schr..... Steel. Steam.	2,029-99	Port McNicoll..... Chicago.	St. Mary's River, Mich.	Collided with <i>Shenango</i> . W. C. Jordan.	.....	Slight.
Sept. 22.	Westport..... 116546	19	Kingston.....	Wood. Steam.	48	Lachine Montreal.	Shoal between Caughna- waga and Lachine.	Stranded..... P. Meloche.	.....	Slight.
Oct. 21.	Winnipeg.....	36	Buffalo.....	Wood. Steam.	874	Buffalo Montreal.	Lachine Canal.....	Stranded..... Thos. Hefferman.	.....	Part.

MASTERS AND SEAMEN BRANCH

REPORT OF B. F. BURNETT, SUPERINTENDENT

Navigation schools were in operation at St. John, N.B., at Halifax, North Sydney and Yarmouth, N.S., at Quebec, P.Q., and at Kingston, Ont., and marine lectures were delivered at Collingwood, Ont., and at Vancouver, B.C.

Examinations for masters' and mates' certificates were held at Halifax, Yarmouth and North Sydney, N.S., at Charlottetown, P.E.I., at St. John, N.B., at Quebec and Montreal, P.Q., at Ottawa, Kingston, Toronto, Collingwood and Porth Arthur, Ont., at Edmonton, Alta, and at Nelson, Prince Rupert, Vancouver and Victoria, B.C.

Issued during the year 23 masters', 14 mates' and 19 second mates' sea-going certificates of competency; 2 masters' and 1 mates' sea-going certificates of service; 59 masters' and 74 mates' coasting certificates of competency; 35 masters' and 40 mates' inland waters certificates of competency; 27 masters' and 25 mates' minor inland waters certificates of competency and 2 masters' service coasting certificates and 42 masters' temporary certificates.

Twenty-five thousand six hundred and eighty-nine seamen were shipped and 24,558 seamen were discharged at sea-ports

PILOTAGE REPORT

CAPT. G. E. L. ROBERTSON, DIRECTOR PILOTAGE

The honourable the Minister of Marine and Fisheries is the Pilotage Authority for the Pilotage Districts of Montreal, Quebec, St. John, N.B., Halifax, and Sydney, N.S. (the latter having been taken over on May 15, 1922), and all matters relating to pilotage in these districts are dealt with through the local superintendents at the above mentioned places.

DISTRICT OF MONTREAL

There are 53 pilots and 9 apprentices in this district. The gross earnings of these pilots was \$227,836.61, as compared with \$181,540.40 in 1921. Only 47 pilots, however, worked throughout the season, their average earnings were \$4,554.47 as compared with \$3,698.86 in 1921.

The total number of ships piloted inward was 1,515 of a total net tonnage of 4,345,877, and the total number outward 1,452 of a total net tonnage of 4,145,790, making a grand total of 2,967 ships of 8,491,667 net tons. This is an increase over 1921 of 544 ships and 1,963,486 net tons.

In this district 5 per cent of the gross earnings of the pilots is deducted for the Pension Fund (Montreal Decayed Pilots' Pension Fund) which fund is administered, without charge, for the Montreal pilots by the Department of Finance.

DISTRICT OF QUEBEC

There are 55 pilots and 8 apprentices in this district. The gross earnings of these pilots was \$216,167.35, as compared with \$176,660.49 in 1921. Only 51 pilots, however, worked throughout the season, their average earnings were \$4,128.87 as compared with \$3,203.87 in 1921.

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The total number of ships piloted inward was 1,499 of a net tonnage of 4,739,961, and the total number outward 1,466, of a total net tonnage of 4,723,744, making a grand total of 2,945 ships of 9,463,705 net tons. This is an increase over 1921 of 369 ships and 2,338,635 net tons.

In this district 7 per cent of the gross earnings of the pilots is deducted for the Pension Fund. This fund is administered by the Quebec Pilots' Corporation, and amounted on December 31, 1922, to \$93,054.58. In addition to the pension received from the Corporation, certain retired pilots, 28 in number, received an annual allowance from the Government of \$300.

GENERAL—MONTREAL AND QUEBEC

Mr. R. A. Williard, Montreal, is the acting superintendent for these districts, and Mr. F. J. Boulay, Quebec, the assistant superintendent.

All expenses for the pilotage services at Montreal and Quebec are paid out of public funds. This amounted, for the district of Montreal, to \$9,515.00 and to \$86,673.40 for the district of Quebec, the latter including the cost of maintenance of the pilot boat *Eureka*, and an amount of \$43,161.84 for the new pilot boat *Jalobert*.

DISTRICT OF HALIFAX

There are 18 first-class pilots and 5 apprentice pilots in this district. The gross revenue for 1922-23 was \$62,204.70. The total amount of expenses, which includes re-payment on loan for purchase of pilot boats, the payment of upkeep for the two pilot tenders, and the amount paid to the Superannuation Fund was \$15,555.88, leaving a balance to be divided amongst the pilots of \$46,648.82. The average net earnings of each first-class pilot was \$2,581.60.

The total number of ships piloted inward was 1,008 and 995 outward, making a total of 2,003 ships, of a total net tonnage of 4,227,279, as compared with 1,980 ships of 4,043,778 net tons in 1921, being an increase of 23 ships and 490,749 net tons.

In this district 5 per cent of the gross revenue is deducted for the Superannuation Fund. This fund is administered, without charge, for the Halifax pilots by the Department of Finance.

Captain H. St. G. Lindsay, Halifax, is the superintendent.

DISTRICT OF SAINT JOHN

There are 13 first-class pilots, 2 second-class pilots, and 1 apprentice pilot in this district. The gross revenue for 1922-23 was \$53,712.75. The total expenses including the upkeep of the pilot tender and motor launch, and the amount paid into the Superannuation Fund was \$45,944.08, leaving a balance to be divided amongst the pilots of \$7,768.67. The average net earnings of each first-class pilot was approximately \$2,540 and each second-class pilot \$1,270.

The total number of ships piloted inward was 473 and outward 487, of a total net tonnage of 2,329,859, as compared with a total of 802 ships and 1,896,814 net tons in 1921.

In this district 12 per cent of the gross revenue is deducted for the Superannuation Fund. This Fund is administered, without charge, for the St. John pilots by the Department of Finance.

Mr. J. C. Chesley, St. John, is the acting superintendent.

DISTRICT OF SYDNEY

This district was taken over on May 16, 1923, under the provisions of an Order in Council, dated April 26, 1923. At this time there were 32 pilots on

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the roll. This number was reduced to 22 by retiring on pension 10 of the older pilots. There are 6 apprentices in this district.

The gross revenue of the district was \$44,964.89 and the total expenses, including the 15 per cent of the gross revenue paid into the Superannuation Fund, \$9,434.99, leaving a balance of \$35,529.90 to be divided among the pilots and apprentices. Each first-class pilot received for ten and one-half months \$1,414.20 and each apprentice pilot \$707.10.

The total number of ships piloted inward was 917 and outward 917 of a total net tonnage of 2,470,252.

In this district 15 per cent of the gross earnings of the pilots is deducted for the Superannuation Fund, which is administered for the Sydney pilots, without charge, by the Department of Finance.

On the taking over of this district, Captain E. M. Dickson, Louisburg, was appointed acting superintendent. He was replaced by Captain J. D. Mackenzie, of Sydney, on January 1, 1923.

GENERAL

Of the thirty-seven pilot authorities constituted under the authority of the Governor in Council in pursuance of the provisions of the Canada Shipping Act, sixteen have forwarded returns for 1922.

CITADEL SIGNAL STATION, HALIFAX, N.S.
Record of shipping as per record folio from April 1, 1922, to March 31, 1923.

1922-1923	Men of War British			Men of War Foreign			Steamers 1st class			Steamers 2nd class			Ships, Barques and Barquentines			Brigs and Brigantines			Schooners 3-Masted or bearing Pt. Signal			Monthly totals			Remarks
	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P	
April.....	5	5	...	3	3	...	58	58	...	29	29	11	11	...	106	106	...	Total vessels— Reported 1254 Arrived 1234 Passed 20
May.....	...	...	...	2	2	...	60	60	...	28	28	...	...	...	...	...	...	...	9	9	...	99	99	...
June.....	1	1	...	3	3	...	43	43	...	26	26	...	...	...	...	...	...	...	9	9	...	82	82	...
July.....	...	...	...	3	3	3	54	51	3	22	22	...	...	...	...	...	...	...	3	3	...	82	79	3
August.....	?	3	...	4	4	...	64	63	1	36	35	1	...	...	...	...	...	...	12	12	...	119	117	2
September.....	8	8	...	...	...	...	56	56	...	29	29	...	...	...	...	...	...	...	7	7	...	100	100	...
October.....	2	2	...	...	...	...	67	63	4	37	37	...	...	...	...	...	...	...	12	11	1	113	113	5
November.....	...	...	...	...	...	...	63	62	1	37	37	...	...	...	...	...	...	...	11	11	...	111	110	1
December.....	...	...	...	...	...	...	81	80	1	29	29	...	...	...	...	...	...	...	6	6	...	116	115	1
January.....	...	...	...	...	...	...	74	73	1	26	26	...	...	...	...	...	...	...	5	5	...	105	104	1
February.....	...	...	...	...	...	...	76	69	7	21	21	...	...	...	...	...	...	...	4	4	...	101	94	7
March.....	1	1	...	...	...	...	80	80	...	28	28	...	...	...	...	...	...	...	6	6	...	115	115	...
	20	20	...	15	15	...	776	758	18	348	347	1	...	...	...	...	...	...	95	94	1	1,254	1,234	20

ANNUAL REPORT ON SABLE ISLAND

H. F. HENRY, SUPERINTENDENT

I arrived at Sable Island on May 1, 1922, in company with Captain P. C. Johnson, Inspector of Lights, taking over duties as superintendent from Acting-Superintendent R. J. Naugle.

During the year two schooners were wrecked on island. The *Puritan* on the northwest bar, and the *Marshall Foch* wrecked on the south side, between Main station and No. 2. The *Marshall Foch* broke up shortly after, and considerable wreckage of no value came ashore at No. 3 station. Having variable winds after the *Puritan* was wrecked, no wreckage came ashore. The dory which came ashore between Main station and Wireless station, was a new double dory, and was found bottom up, three oars and a small bucket were found later; no marks were found on dory. By the looks of dory it had never been used for fishing, but was fitted out for that purpose. The dory was fitted for a sail, but no sail was found. The male body which was washed ashore was in a bad condition of decay. A pair of boots were on his feet (new rubber boots). This body was buried near No. 3 station.

A harbour broke through on the south side west of No. 3 station, known as "No. 13". The old west light has a list to the south, and at high water seas break close to base of lighthouse. Another gulch has formed northwest of No. 4 station, causing tons of sand to lodge about dwelling, lifeboat shed, horse and cow barn, causing a daily task of clearing away sand before the usual daily work can be started. Submitted that an inspection of No. 4 station be arranged at an early date.

The island was surrounded by packed ice from February 12, 1923, to March 7. The schooner which was sighted off East End was believed to have had three masts. Her signals were not made out.

Various repairs done at all stations, including repairing fences, making doors for barns and sheds, and shingling. No. 4 station required extensive repairs to horse and cow barn, which was carried out. South side Main station horse barn shingled, also repaired cow barn.

At Main station had inside of cow barn, horse barn and pig house white-washed, outside of cow barn painted; inside of Superintendent's house and Staffs' house painted; life boats at No. 4 and Main station painted. At all other stations all barns and sheds whitewashed and inside of dwellings painted.

Life boats and beach apparatus and surf boats in excellent condition.

Farming was carried out as usual by No. 3, 4, East Light and Main station. Nothing was grown by West Light and No. 2 station. I will make sure these two stations have a crop this year. The combined crop last fall was 130 bushels potatoes, 50 bushels turnips, 30 bushels carrots, 15 bushels beets, 10 bushels parsnips and various other small seed. The above is what was left after taking vegetables from fields for two months. Main station cut and stowed 60 loads of hay in horse and cow barn. All other stations filled their barns with hay as usual.

Stock killed during year: 6 oxen, weighing 4,150 pounds; 1 hog, 200 pounds. Stock on hand: 40 head of horned cattle, 40 trained horses, 7 young pigs and 3 old pigs; about 200 wild horses. The cows which were sent to island last year are in excellent condition.

The population of Sable Island is now 48, comprising the following:—

<i>Main Station—</i>	
Supt., H. F. Henry, family and maid.....	5
E. H. Blake, cook; D. Johnson, surfman; W. Macnamara, surfman; C. Kenny, surfman; C. Lucas, surfman; Lee, surfman; Bowes, surfman; J. Booth, surfman.....	8
<i>No. 2 Station—</i>	
J. Lynch, keeper, and family.....	3
<i>No. 3 Station—</i>	
W. Blank, keeper, and family; Assistant, O. Mason.....	8
<i>No. 4 Station—</i>	
R. Naugle, keeper, and family.....	8
<i>East Light—</i>	
P. J. Gregoire, keeper, and family.....	8
<i>West Light—</i>	
W. Cleary, keeper, and family; assistant, A. York.....	4
<i>Wireless Station—</i>	
Chief operator, M. Walsh, and wife; assistants, G. Cope, H. Taylor.....	4
Total.....	48

During the year the Island was patrolled 60 times.
Carried out boat drill 12 times, and rocket apparatus 6 times.
Longest continuous fog from June 18, 1922, to July 5, 1922.
I visited all stations 14 times during the year.
Shipped 50 barrels cranberries and 5 hides to department.

REPORTS OF AGENCIES

HALIFAX, N.S., AGENCY

CONSTRUCTION AND REPAIRS

Cape Roce lightstation and Fog Alarm.—Two new 50 horsepower Robb Mumford boilers were installed at the Fog Alarm station, the engineer's dwelling painted and sewerage system overhauled.

Flat Point.—Cribwork for 400 feet was sheathed, and 56 feet repaired.

Flint Island.—A large steel oil storage tank was installed for the Fog Alarm plant at this station.

Guion Island.—A new Fog Alarm building was erected at this station and machinery installed.

Port Mouton.—A new dwelling to replace the one destroyed by fire was built at this station.

Little Hope.—Repairs were made to the cribwork.

Dartmouth depot.—Repairs were made to the railway siding and two new mooring posts added to pile wharf.

Repairs were carried out at the following stations: Ingonish island, Green island, Crichton head, Arichat light, Queensport, Canso harbour, Canso range, Tor bay, Beaver island, Heet rock, Devil's island, Ketch harbour, Croucher's island, Hubbard's cove, Quaker island, Medway head, Point Aconi.

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DOMINION STEAMERS

C.G.S. Dollard.—Employed from April 1 to end of 1922 in lighthouse and buoy service work in the district. From June 5 to end of March, 1923, employed in picking up buoys and icebreaking.

C.G.S. Stanley.—From beginning of April to end of 1922, employed in lighthouse and buoy service work. From January 1 to end of March in ice-breaking.

Lightship No. 15.—From April 1 to May 10 on station on Sambro bank. May 10 to May 31, under repairs. From June 1 to end of November at station at Heath point, balance of year on station at Sambro bank.

C.G.S. Acadia.—From December 20, 1922, to March 18, 1923, employed in icebreaking in district—from March 19 to March 31 undergoing repairs at Halifax.

C.G.S. Aranmore.—From April 1 to June 5, undergoing repairs at Agency wharf. June 7 to November 30, under P.E.I. agency. From December 1 to March 31 at agency wharf laid up.

C.G.S. J. L. Nelson.—From April 1 to March 31 employed in buoy, harbour, and lighthouse services.

C.G.S. Lady Laurier.—From April 1 to October 1 employed in general work of district. November 1 to December 13 undergoing repairs, and loading supplies; for balance of year to March 31 employed in general work of district.

PICTOU, N.S., SUB-AGENCY

Buoys were repaired, painted, and placed in position on May 15, and lifted December 7.

Placing and lifting was done by ss. *Brant*.

The East River channel from Abercrombie point to New Glasgow was bushed and maintained by contract from June 1.

SS. *Stanley* arrived from Halifax April 11, coaled, loaded cargo, and sailed for Magdalen islands April 14. Returned April 22, and sailed for Halifax April 29.

On October 11 notified Charlottetown Agency that Murray harbour bell buoy was reported upset.

Murdock shoal buoy went adrift in December, was recovered by River John parties during the winter.

Oil was obtained for lighthouse keepers when required.

Steamers arrived, 378; 94,820 tons.

Sailing vessels arrived, 267; 14,633 tons.

Steamers departed, 376; 95,726 tons.

Sailing vessels departed, 266; 15,015 tons.

SYDNEY, N.S., SUB-AGENCY

Special attention was paid to harbour aids to navigation by the Provincial Superintendent during 1922.

The Department's wharves at Baddeck and Whyecomagh were repaired and are now in good condition.

Dominion steamers *Lady Laurier*, *Stanley*, and *Montcalm* were employed in the district in lighthouse and buoy service, ice breaking, and assisting ships in distress.

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The C.G.S. *Stanley* was operated during the winter of 1923 from Louisburg to the advantage of the foreign commerce of the British Empire Steel Corporation.

All steamers requiring attention as well as the Steel Company's fleet had the use of the *Stanley* when required.

The C.G.S. *Montcalm* patrolled Cabot strait during the ice season and information by her wireless system enabled vessels entering the gulf to shape the best possible course.

Port of Sydney—	No. of ships	Tons
Coastwise arrivals.....	1,090	932,415
Coastwise clearances.....	944	696,213
Foreign arrivals.....	298	602,688
Foreign clearances.....	446	844,020
Port of North Sydney—		
Coastwise arrivals.....	1,013	311,275
Coastwise clearances.....	1,047	409,922
Foreign arrivals.....	780	227,968
Foreign clearances.....	756	271,091
Port of Louisburg—		
Coastwise arrivals.....	184	149,258
Coastwise clearances.....	183	119,572
Foreign arrivals.....	164	141,638
Foreign clearances.....	205	118,572

ST. JOHN, N.B., AGENCY

During the past year all aids to navigation in the St. John division were duly inspected, and repairs, cleaning, and painting carried out at the different stations.

All told there are at present in the agency district 158 light, fog alarm, and fog bell stations, and the Lurcher lightship equipped with diaphone, submarine fog bell, and wireless apparatus, on Lurcher shoal, 17 miles from Yarmouth.

MAINTENANCE OF BEACONS AND BUOYS

All the agency buoys and beacons, including those maintained under contract, have been well looked after during the past year.

The winter of 1922-23 was unusually severe; some of the buoys were carried out of position by heavy seas and run of ice, but were picked up and replaced by the supply steamers, and none were lost.

The list of buoys maintained by departmental steamers during the fiscal year 1922-23 was: cans, 36; conicals, 39; spars, 92; bells, 29; gas, 3; gas and bell, 4; gas and whistling, 13; whistling, 6.

Buoys maintained under contract were:—Cans, 4; casks, 7; conicals, 7; barrels, 4; spherical, 3; dropping, 2; spindles, 3; bushed stakes, 15; bushes, 490; bushing, 7 miles; spars, 350.

CHANGES IN BUOY SERVICE

Grand Passage.—Whistling buoy replaced by a bell buoy on July 15, 1922.

Musquash harbour.—Black spar buoy on west side of entrance to Musquash harbour replaced by a black can buoy.

St. John harbour gas buoys.—The inner and outer gas buoys, St. John harbour, were changed to their new positions in September, 1922, the outer buoy being placed 2,700 feet, 28° 30' true from Negro point breakwater light; the inner buoy 3,700 feet, 10° 30' true from Negro point breakwater light.

Avon river.—The green can buoy marking the wreck of the schooner *Charlotte Comeau* off Horton bluff, Avon river, was removed in June 1922, with removal of obstruction.

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MAINTENANCE OF WHARVES

The agency has under its supervision 130 wharves, including 5 at West St. John. All repairs found to be necessary by the Superintendent of Lights were carried out under the supervision of the district engineer.

Repairs were made during the year to Earles wharf, Kings County, N.B., Hall harbour wharf, Hampstead wharf, St. George wharf, Westport wharf, White's Bluff wharf, wharves and sheds at West St. John, Cape St. Mary wharf, Carr's Brook wharf, and public wharf at Clark's harbour.

CONSTRUCTION WORK

The old black range tower at Amherst, disused, was dismantled and re-erected at Abbott harbour to replace the old pole light.

A new type "B" diaphone, with two 6-horsepower gasoline engines, and two 8 x 6 compressors was installed at Apple river.

Fifty new spar buoys were made by Mr. J. E. George at Cape Sharpe, to replace old condemned ones.

A steel bridge was erected across the gully between the dwelling and fog alarm at Cape Fourchu.

The old Eatonville light tower was removed to Cape D'Or and a fifth order lens installed in it.

The light on outer end of Harbourville wharf having been carried away in a storm, the front tower of Amherst range was removed and put up in its place.

An oil storage tank was installed at Point Prim Light and Alarm Station.

OBSTRUCTIONS REMOVED

The masts of schooner *Senator* sunk off Chance harbour, N.B., were removed.

The schooner *Abbie Keast* ashore at East cove, near Parrsboro, was broken up and removed.

The schooner *Margaret* ashore at Point Wolf, Albert County, N.B., was broken up and removed, as also the schooner *Flora* sunk just off the wharf.

The schooner *L. C. Wetmore* wrecked at Spencer's island, Cumberland County, N.S., off the harbour, was removed.

The schooner *Effie May* sunk at Two Rivers, Albert County, N.B., and blocking the wharf, was removed.

MOVEMENTS OF VESSELS

Lurcher Lightship.—On September 15, 1922, ship was removed from station and proceeded to Yarmouth for annual repairs.

On November 1, on resuming station, broke chain and windlass and proceeded to St. John for repairs. On November 14 repairs being effected resumed station for balance of winter.

C.G.S. Aberdeen.—Employed generally throughout season in lighthouse and buoy service of the agency. From April 15 to June 8 undergoing repairs at Marine dock, West St. John.

On October 2 and 3 assisted in refloating ss. *Empress* stranded at Black Point, N.B.

From October 9 to December 15, 1922, under repairs at Marine dock, West St. John.

From December 19 to December 26 in dry dock at Halifax.

On December 27, resumed lighthouse and buoy work. January and February employed breaking ice in Yarmouth harbour.

On March 12, resumed lighthouse and buoy work.

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C.G.S. Laurentian.—Employed generally in lighthouse and buoy service in New Brunswick agency.

From April 1 to April 22, 1922, and from December 1 to December 26, laid off for repairs.

During February employed in keeping channel clear at Black's harbour and St. Andrews.

On March 8, broke rudder stock. March 8 to March 27, undergoing repairs at St. John. On March 27 resumed lighthouse and buoy service work.

PARTRIDGE ISLAND SIGNAL STATION

			Tonnage
Steamers signalled.....	47		136,282
Sailing vessels signalled.....	6	three-masted schooners.....	2,317
Sailing vessels signalled.....	2	four-masted schooners.....	1,172
Total.....	55 vessels.	Total tonnage.....	139,771
61 signals answered at Partridge island.			
6 signals answered calling for tug-boats.			

LIFE-SAVING SERVICE

The life-saving stations in the agency were inspected several times by members of the staff.

The stations at Bay view and Westport were discontinued on August 1, 1922, leaving only Little Wood island where a crew of 10 men are employed, the life boat was engaged during the summer in carrying water, mail, and supplies to Gannet Rock Light and Fog Alarm station.

The life-boat from Little Wood island was thoroughly overhauled and repaired at St. John in September, 1922.

QUEBEC AGENCY

CONSTRUCTION AND REPAIRS

At Isle au Marteau two oil storage tanks were installed.

Range lights were established at Miscou harbour and at Riviere du Moulin.

Two oil storage tanks were installed at Perroquet island.

New wharf built between Henry's and Borland's wharves at Quebec.

Pole light established at St. Maurice de l'Echouerie.

Repairs were made to wharves at Anse St. Jean, Berthier en bas, Carleton, Les Eboulements, Allans & Henry's wharves, Quebec, and Ste. Irenee wharf.

Four steel ice buoys made for buoy service, repairs to Charleton point station, Gros Cap lightship, tower and fog alarm at Little Metis station.

Repairs were made to Peribonka range lights and lightkeeper's dwelling at West Point, Anticosti.

WHARVES

During the year the agency had 69 wharves under its control; two new wharves were transferred from the Department of Public Works to the Marine Department, viz those at Cap Chat, Gaspé County, and St. Omer, Bonaventure County.

The wharf at St. Nicholas was leased to the municipality of the parish of St. Nicholas.

The total collections made during the fiscal year 1922-23 amounted to \$17,605.02.

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MOVEMENTS OF VESSELS

C.G. Icebreaker Mikula.—Purchased by department and arrived in Quebec from Cherbourg, France, on August 5. Was berthed at Sorel August 17, and crew dismissed. Early in December crew were engaged and on December 16 she was employed in ice breaking work above Quebec for the superintending engineer of the St. Lawrence Ship channel.

In March while working touched at Cap a la Roche, and was laid up for repairs.

C.G.S. Montcalm.—Up to April 18 employed in ice breaking operations in St. Lawrence Ship channel. From April 18 to May 19 on patrol duty in Cabot strait. From May 19 to June 1 replaced the *Druid*. From June 1 to July 22 undergoing repairs at Quebec. From July 22 to August 15 on lighthouse supply trip. Laid up from August 15 until the autumn. From October 13 to October 24 on supply trip to Anticosti island. From October 24 to December 31 employed in Charlottetown agency work. From December 31 to February 11 employed on north shore in vicinity of Seven islands. From February 11 to end of fiscal year employed in ice breaking in St. Lawrence Ship channel.

C.G.S. Druid.—Employed during fiscal year in buoy service from Platon to Father point, a distance of 185 miles; also towed light ships to their positions in the Spring and back to Quebec in the Fall; was also employed in lighthouse supply work in the district.

C.G.S. Loos.—Replaced the *Rouville* during the year; was overhauled at Sorel and ready for service by May 18; employed in lighthouse supply work until August 10 on which date left for Father point to replace *Eureka* on pilotage work, from August 11 to 19 employed in this work. August 19 to September 6 at Quebec. From September 7 to end of season employed in lighthouse and buoy service in the district.

MONTREAL AGENCY

During the fiscal year 1922-23 there was an increase of \$10,256.66 over the expenditure for 1921-22 due largely to extra coal supply and new buoy service equipment.

No new construction work was carried on during the year.

DOMINION STEAMERS

C.G.S. Argenteuil.—Employed in buoy and lighthouse service on upper St. Lawrence, also lake St. Louis, Ottawa, Richelieu, and Rideau rivers. Also employed for minor repairs to wharves.

C.G.S. Contrecoeur.—Was put into temporary commission to replace *C.G.S. Shamrock* undergoing extensive repairs.

C.G.S. Emelia.—Was used in agency work in place of *C.G.S. Reserve* condemned as unfit for further service.

Tug James Howden.—Employed in agency work in connection with buoy service work.

C.G.S. Lavaltrie.—Employed in buoy service work.

Tug Lac St. Pierre.—Employed in buoy service work.

C.G.S. Shamrock.—Employed in general buoy service work and deliveries of supplies to lighthouses.

C.G.S. Reserve.—Used until early fall for construction lighthouse repairs and general painting work, also in buoy service work.

Caught in heavy storms in early fall. Badly damaged and condemned.

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C.G.S. Vercheres.—Employed throughout season in towing construction scows, in patrol and inspection work, and in recharging shore stations with gas.

Tug Varcennes.—Employed in buoy service work throughout the season.

CHARLOTTETOWN AGENCY

During the year South Tracadie light, N.B., was re-established. A new set of range lights were installed at North Tracadie. The new fog alarm station established at Entry island will be in operation early next season.

GOVERNMENT STEAMERS

C.G.S. Aranmore.—Arrived at Charlottetown from Halifax on June 8, and from that date until October 6 when she sailed for St. John was employed in general work in the district.

C.G.S. Montcalm.—Arrived at Charlottetown from Quebec on October 24. From October 25 to November 1, had engines repaired and loaded coal and supplies, and was employed until December 22 in lighthouse supplies and buoy service work in the district.

C.G.S. Brant.—Went into commission on April 10, and employed in the district chiefly on buoy service work until December 20 when she laid up at Georgetown.

VICTORIA, B.C., AGENCY

Agency work for the fiscal year 1922-23 included supervision and maintenance of all aids to navigation, purchasing and forwarding supplies to light stations, and supplies for the Hydrographic and Radiotelegraph services were also purchased through the agency.

NEW CONSTRUCTION

The new concrete lighthouse at Carmanah station was completed.

A new steel tower was erected on Yellow rock and a quick flashing light established.

A new beacon tower was constructed on the North shore at the entrance to Vancouver harbour carrying gas operated fog bell and automatic light; several small beacons were also built.

REPAIRS

All necessary repairs to aids to navigation, light and fog alarm stations were carried out, and all obstructions to navigation removed.

LIFE-SAVING STATIONS

The life-saving stations at Banfield and Clayoquot were efficiently manned and maintained at all times, the crews performing valuable work, in particular the rescue of the crew from the wrecked steamer *Tuscan Prince*.

CASUALTIES

There were a number of casualties to shipping on the coast: the ss. *Alaskan* of Victoria with her entire crew of 13 men was lost near Pachena point, Vancouver island, on January 2, 1923.

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On the 13th and 14th of February the following vessels were wrecked but without loss of life: ss. *Santa Rita* at Clo-oose, total wreck; ss. *Tuscan Prince* at Village island, Barclay sound, total wreck; motor ship *Coolcha* at Albert head, Vancouver island, since salved, but hull not worth repairing.

DOMINION STEAMERS

C.G.S. Estevan.—April 1 to 22, undergoing annual inspection and repairs—April 22 to November 4 employed in general agency work. November 4 to 15 undergoing engine repairs; November 16 to March 29 employed in lighthouse and buoy service in district.

C.G.S. Berens.—April 1 to May 20 employed in agency work; May 20 to June 1, undergoing annual inspection and overhaul. June 1 to March 29 employed in general work in district.

C.G.S. Newington.—Was employed in the district from August 24 to September 14 in lighthouse and buoy service.

PRINCE RUPERT, B.C., AGENCY

A new fog alarm building was erected at Lawyer Island station, and the plant installed.

A new derrick was framed and erected at Ivory Island light station.

The steamers *Newington* and *Birnie* were overhauled, repaired, and painted at Prince Rupert dry dock.

The six Government wharves in the district were maintained in good repair.

DOMINION STEAMERS

C.G.S. Estevan arrived in the district on July 19, and was employed in the district until August 10, when she was turned over to the Fisheries Commission.

C.G.S. Newington.—Was employed from April, 1922, to end of March, 1923, in lighthouse supply work and attending to buoys and beacons in the district.

C.G.S. Birnie.—Was employed from April, 1922, to end of March of following year in district work.

Launch Rhona, exclusive of time for overhauling, was continuously engaged throughout the year in transferring from Prince Rupert to the agency mail, supplies, and passengers, making two or three regular trips every day.

FORT WILLIAM, ONT., SUB-AGENCY

The usual work in connection with the lighthouse and buoy services and ice-breaking was carried on throughout the year.

On April 18, nine lightkeepers were sent to their stations and on the same date the first vessel arrived from the east. Spar buoys were in position on April 22, gas buoys at Port Arthur and Fort William on April 29, and at Hare and Welcome islands on May 4.

On August 12, ss. *Grenville* arrived at Port Arthur and after supplying lighthouses in the district left on August 18 for the east.

On November 27 the Hare and Welcome islands gas buoys were lifted and on December 9 the Port Arthur and Fort William gas buoys. The last vessel for the east left on December 17.

In Fort William and Port Arthur harbours, 38 spar buoys were maintained during the season, 2 gas buoys, and 3 gas and bell buoys. Six gas buoy lanterns were sent to Parry Sound to be overhauled.

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DOMINION LIGHTHOUSE DEPOT, PRESCOTT, ONT.

The Depot shops during the year performed a good deal of work in connection with the preparation of lighthouse, fog alarm, and buoy materials for the different agencies of the department.

All lights, buoys, and beacons in the Prescott division were properly maintained, and necessary repairs made to the steamers *Concretia* and *Scout*, a considerable amount of work was also done on the Gros Cap lightship.

Machine Shop Department.—About 190 orders were completed during the year and work done on a number of orders not yet completed. These orders included the making of vapour supply parts, buoy materials, overhauling and repairing of lanterns for the various agencies, the preparing of all forms of lighting apparatus, and necessary repairs to the depot plant, and the government steamers of the Prescott division.

Coppersmith and Tinsmith Shop Department.—This department looked after all the coppersmith and tinsmith work in connection with apparatus and materials prepared by the machine shop, all repairs to government steamers in the Prescott division, repairs to the plant of the depot, and to lighting apparatus received from the different agencies.

Carpenter Shop Department.—This department attended to all work in connection with proper repairs to depot buildings, to the hulls of the government steamers, and to the making of packing cases for all shipments from the depot, materials also were prepared during the year.

Paint Shop Department.—All government steamers were painted, also buoy superstructures, lighthouse apparatus, and materials made up in the various shops, and all fences and buildings connected with the depot plant.

The Gros Cap lightship was also overhauled and painted.

Brass Foundry Department.—Turned out a large number of brass castings, including castings in connection with vapour light supplies, buoy superstructures, headlight lanterns, buoy lantern materials, control valves, and various forms of lighting apparatus, and also all necessary brass castings required for the Government steamers of the Prescott division.

Packing and Shipping Department.—Shipments to the number of 453 were sent out from the depot during the year.

All shipments were carefully sorted and packed, and shipping lists prepared, and all cases and packages numbered and addressed.

Goods delivered to the Dominion Lighthouse Depot were unpacked in the Shipping Department, checked and assigned to their proper places.

Second hand materials received were unpacked, examined, and prepared for valuation.

Blacksmith Shop Department.—Forgings were made for trap door for Entry island.

Iron work was made for Soulanges light.

Forgings were made for 18 concrete anchors and for apparatus for Seven islands and Beaver island stations.

All blacksmith work in connection with repairs to Gros Cap lightship and government steamers was done, and a number of different sorts of tools, foundation bolts, shackles, brackets, etc., manufactured.

Shipyard Department.—This department looked after the cleaning and painting of all gas and conical buoys stored on the Dominion Lighthouse dock; the loading and unloading of railway cars; carrying of freight to and from the depot; care of the Dominion Lighthouse Depot grounds; heavy labour for the various shops when required.

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The following were made by the department: 70 spar buoys, 24 concrete anchors.

Gas Test Room Department.—The repairing, painting, and testing of all buoy and lighthouse lanterns belonging to the Prescott division was done by this department.

Buoy lanterns received from the various agencies were overhauled, and all Pintsch gas shipments received at the depot were measured up and reported on.

The following articles were turned out during the year: 103 carbide door gaskets, 103 purifier door gaskets, 100 purifier can gaskets, 2 gross flash burner gaskets, 103 6½-inch diaphragms, 124 11½-inch diaphragms, 12 8¾-inch diaphragms.

Pattern Shop Department.—All patterns belonging to the depot were overhauled and stored, and records kept of all patterns shipped from the depot.

Fourteen new patterns were made during the year, and assistance was given in the work of the draughting office.

Drawing Office.—Sketches were made for use in the Dominion Lighthouse Depot shops, and also to accompany requisitions for materials forwarded to the Purchasing branch. During the year 20 drawings were made, and clock-work and other apparatus was tested, and goods received at the depot examined and reported on.

DOMINION STEAMERS

C.G.S. Concretia.—Was repaired and fitted out at Kingston and went into commission on May 12, charged and placed part of the gas buoys in the district, and inspected all buoys, delivered supplies to light stations, and attended all unwatched lights and beacons, went out of commission on December 18.

C.G.S. Scout.—Was fitted out at Prescott and went into commission on April 12, charged and placed all gas buoys east of Prescott, and also a number in the west part of the district, delivered all lighthouse supplies to stations east of Prescott and laid up on December 18 at Prescott.

PARRY SOUND, ONT., AGENCY

All unwatched lights in the Parry Sound and Waubuno channels were maintained and looked after.

At the close of navigation and during the winter months of 1922, all work in connection with the overhauling and testing of gas buoy lanterns from Sarnia to the head of lake Superior was undertaken and completed in time for the opening of navigation, 11 Aga lanterns, 39 gas buoy lanterns, 15 gas buoys, 3 bell buoys, and 1 conical buoy were put in condition.

DOMINION STEAMERS

C.G.S. Grenville.—Went into commission on April 13 up to June 15, employed in Georgian bay and lake Huron in lighthouse and buoy service.

On June 1, commenced annual trip covering lake Erie, Detroit river, lake Huron, Georgian bay and North channel, St. Mary's river and lake Superior, completed same on September 1; from September 1 to December 22 when she laid up, employed in buoy service in Georgian bay.

C.G.S. Lambton.—Left Sault Ste. Marie on April 18 with all lightkeepers for the east end of lake Superior on board, and was lost with all hands off Caribou island in a severe storm on April 19.

C.G.S. Murray Stewart.—Control of this vessel was taken over by the agency on December 6 at Amherstburg.

She arrived at Midland after delay through stress of weather on December 15, continued icebreaking operations there until December 28, when she laid up.

REPORTS OF HARBOUR COMMISSIONERS

QUEBEC HARBOUR COMMISSION

CHIEF ENGINEER'S REPORT

Dredging.—The commissioners Dredge No. 2 worked in the estuary of the St. Charles river from the 12th of July to the 17th of November. The work consisted in widening the channel north of pier No. 1 to a minimum of 800 feet and providing a turning basin for vessels west of Pier No. 1, the whole to a minimum depth of 35 feet at low water.

The total yardage removed was 330,587 cubic yards of sand, boulders and mud.

Old North Wall facing.—At the west end of the Commissioners' property the old north wall was rebuilt from mean water level to coping for a distance of 440 feet with B.C. fir and sheathed with hard wood. This work was rendered necessary on account of the old timbers not being capable of supporting the track nor retaining the filling material.

Telescoping Gantry Grain Loader.—The machinery in one of the telescoping gantry grain loaders, damaged two years ago during a severe wind storm, was installed this year, the structural steel having been re-erected last year. This grain loader is now working satisfactorily.

Grain Elevator Alterations.—To improve the efficiency of Grain Elevator No. 2, many alterations and additions to the power-house and elevator have been made. New electrical devices have been installed, some motors increased in size, bagging scales, new telephone lines, etc., added. The plans are prepared for the erection of a new bagging shed to meet the requirements of the local grain merchants.

Grain Galleries.—All exposed steel and iron work in connection with the 2,050 feet trestle supporting the grain galleries as well as the two cross-galleries from the elevator, loading spouts, etc., were scraped and painted with red lead and a coat of metallic grey paint.

Railway Lines.—Owing to the heavy type of rolling stock used in connection with the passenger specials, about 5,000 feet of track was replaced with 80-pound rails extending from the western end of the Commissioners' property to the northern end of Shed No. 26.

Berth No. 26.—Floor of shed at this berth was repaved with 3-inch dressed spruce. The overhead passage-way to Immigration building was prolonged to shed No. 18, and a new ramp from shed No. 26 to passage-way built.

Berth No. 19.—Floor of shed was repaved with 3-inch dressed spruce and the quay surface north and east of shed paved with concrete.

Breakwater Facing.—The longitudinal cross ties to a depth of between 4 and 12 feet below coping level are being replaced by 12-inch square B.C. fir on the 880 feet of the breakwater length with oak sheathing on the river side. About 50 per cent of this work has been finished this year.

Indian Cove.—The wharf at Indian cove is being rebuilt, open cribwork filled with stone.

Fuel Oil Pipe.—A ten-inch fuel oil pipe was laid from a 55,000 barrel oil tank at west end of Commissioners' property to serve berths Nos. 18, 25, 26, 27 and 28.

This system will be extended next year.

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Berth No. 28.—Extensive additions and alterations have been made to this berth to accomodate the Canadian Pacific Steamships of the *Empress* type; these include a 30-foot extension on north side, six additional tracks, new platforms and landing stages.

General Improvements.—Consist of extending Commissioners' rail system south to the property of the Canada Steamship Lines, Ltd. New floating fenders for vessels, and the commencement of a new machine shop on Commissioners' property leased to Alex. McKay & Co. to be completed at beginning of next season.

WHARFINGER'S REPORT

The traffic in connection with the St. Charles river docks and wharves was: Ocean-going inwards 386 vessels, 1,666,385 tons register; outwards 134 vessels, 640,765 tons register.

Lower port steamers: Inwards 101 vessels, 22,172 tons register; outwards 103 vessels, 28,051 tons register.

Quebec to Montreal: Inwards 161 vessels, 34,113 tons register; outwards 159 vessels, 32,778 tons register.

The docks were occupied during the winter months by 149 vessels of various tonnages.

HARBOUR MASTER'S REPORT

March 15, yacht *Bikira* arrived from St. Laurent, Isle of Orleans.

The opening of navigation commenced on March 30 when ss. *Guide* left Quebec for the north shore.

On April 7 the first coaling steamer, the ss. *Guide*, arrived from the north shore.

On April 30 the first Atlantic mail and passenger steamers arrived, viz: the ss. *Montreal* from Trieste and the *Empress of Scotland* from Southampton.

Navigation closed on December 12, when all vessels except some of the government steamers went into winter quarters in the inner and outer Louise basin.

TRAFFIC MANAGER'S REPORT

Loaded cars received.....	5,416	
Loaded cars forwarded.....	7,991	
	<hr/>	13,407
Empty cars received.....	7,646	
Empty cars forwarded.....	5,002	
	<hr/>	12,648
Total number of cars handled.....		26,055
Loaded passenger mail and baggage cars handled.....		1,832
Total number of coal cars handled.....		5,143

GRAIN ELEVATOR No. 2

Grain received

In store at end of season of 1921.....		208,423 bush.
Wheat.....	2,009,207 bush.	
Corn.....	347,443 "	
Oats.....	1,310,145 "	
Other grain.....	8,545 "	
	<hr/>	3,675,340 "
Total.....		3,883,763 "

Grain delivered

By conveyors.....	1,949,635 bush.	
" cars.....	225,879 "	
" bags.....	1,427,214 "	
	<hr/>	3,602,728 bush.

In store January 1, 1923..... 281,035 "

Of the total quantity of grain delivered, 1,653,093 bushels were local deliveries of which amount 280,228 bushels were recleaned.

REVENUE AND EXPENDITURE

The operating receipts in 1922 amounted to \$376,455.65, the operating expenditures to \$309,361.23, leaving a surplus for the year of \$67,094.42.

GENERAL

On the death of Sir David Watson, Chairman of the Quebec Harbour Commission, on February 18, 1922, a new commission was appointed by Order in Council of February 23, with Mr. W. G. Power as chairman and Brigadier-General T. L. Tremblay and Mr. Jules Gauvin as commissioners.

Following the resignation of Mr. St. George Boswell after forty-six years' service, Brigadier-General T. L. Tremblay was appointed on July 1, 1922, Chief Engineer and General Manager of the Quebec Harbour Commission.

The harbour was visited during the course of the year by a party of 51 members of the House of Commons from the western provinces, delegates from the American Association of Port Authorities and Sir Henry Thornton, President of the Board of Directors of the Canadian National Railways.

MONTREAL HARBOUR COMMISSION

PERSONNEL

The personnel of the Montreal Harbour Commission for 1922 is as follows: President, W. L. McDougald, Esq.; Commissioners, Emilien Daoust, Esq., and Milton L. Hersey, Esq.

OFFICIALS

M. P. Fennell, Jr., General Manager and Secretary.
 Thos. F. Trihey, Assistant to the Secretary.
 Paul Larocque, Treasurer.
 George E. Smart, Comptroller.
 Thos. W. Harvie, Chief Engineer.
 F. W. Cowie, M.Inst.C.E., M.Amer.S.C.E., Consulting Engineer.
 Paul Leclaire, Assistant Chief Engineer.
 Capt. J. F. Symons, Harbour Master.
 D. J. Perrault, Deputy Harbour Master.
 Robt. A. Eakin, Paymaster and Wharfinger.
 J. Vaughan, Superintendent of Railway Terminals.
 R. L. Mercier, Assistant Superintendent of Railway Terminals.
 M. Peterson, General Superintendent of Grain Elevators.
 Geo. Gendron, Mechanical Superintendent.
 I. C. Franklin, Manager of Warehousing Division.
 L. H. A. Archambault, Purchasing Agent.
 P. E. Morant, Supervisor of Customs Wharfages.
 Lieut.-Col. E. A. Williams, Chief of Police.

GROWTH OF PORT OF MONTREAL

In 1921 the port of Montreal established the four following records:—

1. The greatest number of ships in port on any single day.
2. The greatest number of ocean arrivals in any one year.
3. The greatest tonnage of ships in any one year.
4. The greatest quantity of grain handled and shipped in any one year.

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These records have all been surpassed in 1922, and in particular the last. The growth of Montreal as a grain exporting centre during the past year has been little short of marvellous.

Crop year	Total handlings	Gross shipments
	bushels	bushels
1920-21.....	100,499,124	89,502,215
1921-22.....	195,223,119	189,392,172
Increases in 1921-22 over 1920-21.....	94,723,995	99,889,957

ACCOMMODATION

During 1922 the accommodation and facilities of the port were increased by the completion of the warehouse and cold storage plant, the extension of a number of central piers and shore wharves, the continued electrification of Harbour railways, erection of sheds, and additional dredging operations.

COMMISSIONERS' WAREHOUSE

A detailed description of this plant situated at the foot of Beaudry street was given in the 1921 report. It commenced operations on April 24, 1922, and is now an outstanding feature of the harbour of Montreal, spacious, complete, and equipped with every modern convenience.

During the year all minor details of equipment were completed, including installation of heating system, insulation of pipes, erection of offices, completion of filling and painting and of approaches to the warehouse.

ENGINEERING DEPARTMENT

The following were the principal items of construction undertaken during the year:—

- Dredging approach channel for Bickerdike pier extension.
- Extension of Alexandra pier.
- Extension of King Edward pier.
- Extension of Jacques Cartier pier.
- Extension of Marine Tower jetty and grain conveyor system at Elevator No. 2.
- Completion of shore wharves, sections 27, 28, and 29.
- Extension of Imperial Oil wharf at Montreal East.
- Erection of sheds, the installation of the necessary water supply and extension on sidings for new timber depot on Bickerdike pier.
- Erection of offices upper floor of shed No. 2 and new offices in shed 16.
- Completion of construction and equipment of cold storage warehouse and power-house.
- Construction of approaches to and erection of offices in cold storage warehouse.
- Continuation of electrification of harbour railways.
- Installation of new system of harbour lighting.
- Completion of trunk sewer on south shore.
- Establishment of new berth for Longueuil ferry, near Desery street.
- Paving of wharf at sections 23 and 24.
- Completion of Sailors' Memorial Tower on Victoria pier.

Dredging approach to Canada Cement Company's wharf at Montreal East.
Completion of new track layout in vicinity of cold storage warehouse, power-house and shed No. 24.

Construction of underground conduits for telephone, fire alarm and messenger service cables opposite King Edward pier and at Victoria pier.

The general maintenance of berths, channels, wharves, railways, roadways, sewers, water service, scavenging, lighting, hoists, bridges, subways, flood gates, etc., was carried on as usual.

NEW TIMBER DEPOT, BICKERDIKE PIER

The erection of a saw-mill and storage shed, fireproof, and with necessary sidings and water supply, has been begun. The length of the mill will be 201 feet 10 inches over all, the width 111 feet over all, divided into three bays of nearly even spans; the length of storage shed will be that of the mill, the width 81 feet; the floor of both buildings will be of concrete raised 3 feet 9 inches above the level of the pier; the roofing will consist of tar and gravel, reinforced with roofing felt. It is expected that the buildings will be completed by the opening of navigation next season.

DREDGING AND FILLING

This work began on April 26. For the first half of the season a force of only one dredge and two floating derricks was operated; as wharf construction progressed the force was increased to two dredges and four derricks, which were worked to capacity.

Besides dredging over crib sites, new dredging was concentrated on the channel and site of the Bickerdike pier extension. Besides wharf construction, another item of filling was the protection of the old riverside wharf from section 30 to a point just below the Longueuil ferry berth at Poupart street.

Total dredging during the season amounted to 294,290 cubic yards; rock filling to 259,960 cubic yards.

GRAIN ELEVATOR SYSTEM

This was the most intensely operated department of the harbour organization during the past year. From the opening of navigation to the departure of the last grain ship the Commissioners' elevators were operated day and night on seven days of each week. Superb service was given and no breakdowns occurred, although the elevators and their staffs were worked to the limit of their capacity.

In order to meet the increasing strain on the system it is proposed to construct a new elevator No. 3 at Tarte pier providing seven additional grain berths suitable for tramp steamers, and to enlarge the Grand Trunk Elevator "B" at Windmill point, capacity 2,150,000 bushels, by adding three additional berths.

RECORD OF THE RECEIPTS AND DELIVERIES OF THE HARBOUR COMMISSIONERS' ELEVATOR SYSTEM FOR 1922

<i>Elevator No. 1</i> —Capacity 4,000,000 bushels.		
Date first vessel unloaded, April 25, 1922.		
Date last vessel unloaded, December 13, 1922.		
Total receipts, 56,981,777 bushels.		
By water 39,152,360 bushels, taken from 546 steamers and 83 barges, or 629 vessels.		
By cars 17,829,417 bushels, unloaded from 10,119 cars.		
Delivery was made as follows—		
By conveyors.....	55,167,701 bushels	
By cars.....	1,341,151	"
By teams.....	403,361	"
By bags.....	78,014	"
	<hr/>	
	56,990,227	"

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Elevator No. 2—Capacity 2,662,000 bushels.

Date of first vessel unloaded, April 25, 1922.

Date last vessel unloaded, November 29, 1922.

Total receipts, 63,097,363 bushels.

By water, 29,701,637 bushels, taken from 443 steamers and 66 barges, or 509 vessels.

By cars, 33,395,726 bushels, unloaded from 18,280 cars.

Delivery was made as follows—

By conveyors.....	60,148,864 bushels
By cars.....	1,384,713 ..
By teams.....	881,666 ..
By bags.....	680,768 ..
	<hr/>
	63,096,011 ..

Elevator System Stocks at end of season, 1,986,425 bushels.

GRAIN CLEARANCE BOARD

At the close of the season of 1921 owing to the large amount of grain pouring into Montreal from the west it was decided to appoint a board consisting of four members to control the grain situation.

The 1921 board consisted of the chairman, M. P. Fennell, Jr. General Manager of the port; E. N. Todd, General Foreign Freight Agent of the Canadian Pacific Railway to represent that line; C. J. Smith, manager of the Montreal Warehousing Company, to represent the Grand Trunk Railway and Elevator "B," and T. R. Enderby, Operating Manager of the Canada Steamship Lines, to represent the Inland Steamship Companies.

So well did this board function that it was reappointed at the commencement of the season of 1922, with excellent results, supplying accurate and up to date information of the movement of grain through the port of Montreal covering:—

1. Stocks in the Montreal elevators showing grades, etc.
2. Records of lake vessels en route from Port Colborne to Montreal.
3. A record of the stocks in Port Colborne elevator.
4. A list of the large vessels waiting at Port Colborne to be unloaded.
5. List of vessels en route from Fort William to the Bay ports and Montreal.
6. Shipments by rail from the Grand Trunk Bay ports, Depot Harbour, Tiffin, Goderich and Midland.
7. Similar information in regard to the Canadian Pacific Bay ports, Port McNicoll and Goderich.
8. List of tramp steamers chartered to load at Montreal.
9. Tramp steamers coming up the St. Lawrence.
10. Record of each day's receipts and deliveries of grain by the Harbour Commissioners' Elevators and Grand Trunk Elevator "B."
11. Record of the total quantity of grain handled to date, including receipts and shipments, for the whole port.
12. List of tramp steamers in the order in which they are to receive grain.

HARBOUR RAILWAY TERMINALS

Total handling for the year amounted to 200,593 cars, an increase over the figures for 1921 of 57,039 cars. The harbour tracks have now been electrified from section 19 to section 101, a distance of 8.4 miles with overhead catenary system over approximately 44 miles of equivalent single track.

On November 22, 1922, the first electric locomotive was operated on the harbour tracks.

The mileage of the harbour railway tracks in 1922 was 58.77

POLICE DEPARTMENT

During the season of 1922 the Harbour police force consisting of 1 chief, 3 captains, and 50 constables regulated traffic on the wharves, maintained order, and protected life and property within the harbour limits. Thirty-two constables of the force were continuously at the service of the various shipping companies during the season for special service in protection of cargoes.

During the winter season the force consisted of four officers, twenty constables, and one fireman.

During the season, 127 passenger ships docked with 30,890 passengers; the same number sailed with 36,578 passengers; 64,340 passengers arrived and 17,045 sailed on Canada Steamship Line boats, making a grand total of 148,793 passengers handled during the season. Four men were saved from drowning by the harbour police and first aid was rendered to 16 persons.

FINANCIAL STATEMENT

Income on revenue account amounted to \$3,460,810.87, an increase of \$569,536.45 over last year's, mainly due to increased income from the Grain Elevator System and Railway Traffic Department.

The cost of operation, maintenance, interest, sinking fund, etc., was \$3,194,448.16, an increase of \$470,348.14 over last year's, leaving a surplus to the credit of revenue account for the year of \$226,362.71.

SHIPPING

STATEMENT showing the Nationalities and Tonnage of Sea-going vessels that arrived in Port during the season of 1922, which were navigated by 73,146 seamen.

Nationality	Number of Vessels	Tonnage
British	893	3,111,756
Norwegian	104	226,807
Italian	52	188,264
American	52	175,168
Dutch	30	89,294
Danish	24	37,285
French	13	33,352
Greek	9	27,379
Swedish	7	12,653
Belgian	3	10,013
Jugo Slav	3	9,143
Spanish	2	6,620
Finnish	1	2,605
German	1	2,298
	1,194	3,932,637

Of the above 1,160 were built of iron or steel, with a tonnage of 3,921,830 and 34 were built of wood, with a tonnage of 10,807.

GENERAL

During the year the port was visited by the English war ships *Raleigh*, *Constance* and *Calcutta* on July 3, and by the French war ship *La Ville D'Ys* on September 5. A number of distinguished visitors inspected the port during the season including members of the Association of American Port Authorities,

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Senators and Members of Parliament, mayor and Board of Trade of Regina, Harbour Commissioners of Savannah, Ga., President and Dominion Council, Navy League of Canada; Catholic School Commissioners and professors, and a number of others.

THREE RIVERS HARBOUR COMMISSION

STATEMENT of Number and Tonnage of Steamers and other Vessels reported Inward and Outward at the Port of Three Rivers, for the year, 1922.

Ocean Traffic — Nationality	Return of Vessels Inward		Ocean Traffic — Cleared for	Return of Vessels Outward	
	No.	Reg. tons		No.	Reg. tons
British.....	19	50,089	Inland ports.....	16	41,340
Norwegian.....	9	18,572	Sea ports.....	23	56,439
American.....	4	15,474			
French.....	2	5,107			
Danish.....	2	1,898			
Dutch.....	1	2,964			
Canadian.....	1	2,603			
Swedish.....	1	1,072			
	39	97,779		39	97,779
United States Traffic			Inland Traffic		
Canal boats and barges.....	95	18,917	Steamboats, tugs and barges.	1,266	955,600

RECAPITULATION

Ocean traffic.....	39	97,779
United States traffic.....	95	18,919
Inland traffic.....	1,266	955,600
Grand total.....	1,400	1,072,298

MERCHANDISE

INWARD OCEAN TRAFFIC		OUTWARD OCEAN TRAFFIC	
Coal (bituminous).....tons	105,112	Lumber.....ft. b.m.	2,841,075
Fuel oil.....gals.	4,707,774	Paper.....tons	5,917
Pig-iron.....tons	7,502		
Saltcakes.....tons	9,840		
Sulphur.....tons	27,877		
UNITED STATES TRAFFIC		UNITED STATES TRAFFIC	
Coal (anthracite).....tons	5,490	Laths.....laths	2,092,650
Moulding sand.....tons	925	Lumber.....ft. b.m.	6,726,997
Paper roll cores.....pes.	1,001	Paper.....tons	10,920
Sulphur.....tons	1,338	Pulp.....tons	757
INLAND TRAFFIC		INLAND TRAFFIC	
Apples.....bush.	3,650	Coal.....tons	65
Bricks.....bricks	1,186,000	Concrete beams.....tons	425
Cedar posts.....posts	50	Hay.....tons	27
Cord wood.....cords	1,483	Lumber.....ft. b.m.	1,710,592
Lumber.....ft. b.m.	1,806,105	River sand.....tons	51,000
Hay.....tons	263	General cargo.....tons	6,000
Pulp wood.....cords			
Shingles.....pes.	235,000		
General cargo.....tons	10,000		

RECEIPTS AND DISBURSEMENTS FOR THE YEAR 1922

RECEIPTS		DISBURSEMENTS	
	\$ cts.		\$ cts.
Tonnage dues.....	3,920 58	Shed repairs.....	884 10
Harbour dues—Inward.....	11,405 49	New shed.....	55 00
Harbour dues—Outward.....	2,262 98	Wharf repairs.....	26,556 88
Moorage dues.....	1,412 05	Stationeries and print.....	269 89
Shed rentals.....	940 00	Sundries.....	722 90
Wharf rentals.....	4,615 00	Notes paid.....	22,550 00
Sundries receipts.....	670 29	Salaries.....	6,172 80
Interest on current accounts.....	14 55	Office expenses.....	648 11
Commutation.....	755 00	Office furnitures.....	181 00
Travelling expense refund.....	150 00	Tool repairs.....	11 43
Accounts to collect.....	4,492 18	Interest on debentures.....	10,261 74
	30,638 12	Interest on current accounts.....	1,923 65
From La Banque Provinciale.....	347 29	Deposited to Sinking Funds.....	347 29
Interest on Sinking Funds.....	840 61	“ “.....	119 20
Sales of debentures.....	27,500 00	“ “.....	721 41
Note (promissory).....	25,000 00	“ “.....	2,180 00
Note receivable.....	1,200 00	Accounts receivable.....	4,492 18
Cash balance Dec. 31, 1921.....	781 58	Note receivable.....	800 00
		Cash balance Dec. 30, 1922.....	7,410 02
	86,307 60		86,307 60

VANCOUVER HARBOUR COMMISSION

PERSONNEL

The Harbour Commisison at present consists of G. H. Kilpatrick, Esq., President; R. E. Beattie, Esq., Commissioner; and S. L. Prenter, Esq., Commissioner.

The chief officials of the commission are Secretary, W. D. Harvie; Chief Engineer, W. G. Swan; Comptroller, Charles Reid; Harbour Master, A. H. Reed; Chief Accountant, P. M. Ferris; Superintendent of Signals and Police, C. C. Julian.

GROWTH OF PORT

The number of ocean-going vessels using the port in 1921 was 496, in 1922 717, an increase of 221 vessels, and of gross tonnage 1,021,824 tons.

Volume of cargo imports and exports in 1921 was 2,139,888 tons; in 1922, 2,930,983 tons, an increase of 791,095 tons.

Combined exports and imports of lumber and logs in 1921 was 711,051,591 feet B.M.; in 1922, 1,011,218,527 feet B.M., an increase of 300,166,936 feet B.M. In 1922 there was an increase of over 37,000,000 feet B.M. of export lumber, as compared with the export for 1921; 71,572,799 feet B.M. was exported to Japan; to U.S. 67,043,773; to Australia and New Zealand 26,224,788; to China 11,519,328; to United Kingdom 11,309,842; the balance was distributed among more than twenty other countries.

During the course of ten years regular steamship lines using the port have increased from less than a dozen to more than forty, in addition to many occasional traders.

At present there are twelve sailings a month to the United Kingdom, 14 to Japan, 12 to China, 2 to France, 2 to Holland, 5 to Belgium, 1 to Brazil, 2 to Chile, 2 to Colombio, 3 to Cuba, 1 to Costa Rica, 2 to Denmark, 2 to Ecuador, 1 to Fiji, 3 to Germany, 2 to Guatamala, 1 to Hawaii, 1 to Java, 2 to Mexico, 1 to Nicaragua, 1 to Norway, 2 to Peru, 5 to the Phillipines, 2 to Porto Rico, 2 to Salvador, 1 to West Indies, 1 to Spain, 1 to Straits Settlement, 2 to Sweden, approximately 5 or 6 to Australia and New Zealand, and sailings to India every six weeks.

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During the calendar year 1921 grain shipments were:

	bush.
To the Orient.....	359,428
To the United Kingdom and continent.....	891,642
Total.....	1,251,070

During the calendar year 1922 grain shipments were:

	bushels
To the Orient.....	3,680,155
To the United Kingdom and continent.....	10,783,728
	14,463,883

BALLANTYNE PIER

Good progress is being made in the construction of this pier which when completed will be an outstanding feature of the harbour and add much to its facilities.

A general description of the pier was given in the 1921 report.

The general procedure of the work is that each process is started at the shore end on the West side and travels outward to the end of the pier and then back along the east side, so that the shore end of the east side will be the last portion completed. Each of the processes of cylinder sinking, truss and beam setting, pouring of concrete deck, piling and filling, pouring of first floor of sheds and pouring of roof follows closely behind the last, and each one is carried on steadily to completion.

It is expected that the entire structure will be completed by the fall of 1923.

PROSPECT POINT SIGNAL STATION

On November 1, 1922, this station was taken over from the Department of Marine and Fisheries and came under the control of the port authorities.

A superintendent and three qualified signal men were appointed, and an all day and night watch is kept.

A satisfactory working arrangement has been made whereby masters of ocean-going vessels inward bound transmit through the Point Grey wireless station to the signal station the position and time of arrival of their vessels. These reports when received are forwarded by telephone to the vessels' agents.

Working in conjunction with the signal station is a reporting station on Granville island, the industrial area near the entrance to False creek, which telephones daily to the Prospect point station details of all False creek traffic.

TERMINAL RAILWAY

The Burrard inlet section running from the Great Northern Interchange near Ballantyne pier east of Government wharf and No. 1 Elevator will be completed during the midsummer of 1923.

The system when completed will connect False creek terminals with Ballantyne pier and the Government wharf and will be operated by the Commissioners, with running rights over the Great Northern Railway Company's spur from the interchange to the Canadian National Terminals at False creek.

The Commissioners Terminal system including the Burrard inlet section, and the Ballantyne pier and Granville island trackage will comprise about ten miles of tracks.

GOVERNMENT WHARF

Improvements and repairs to this structure were carried out during the year. A plank roadway extension was built along Stewart street 500 feet long, and other roads to the wharf and elevator were macadamized and repaired. Roof of shed No. 1 was repaired during the dry season. A heavy timber fender was built at the N.W. corner of the wharf as a protection to vessels using the west berth.

GRANVILLE ISLAND

Considerable road repairs were made and sections of permanent pavements laid; it is the intention to pave the entire system of roads on the island. The sewerage pumping plant was overhauled, several new water connections made, and some replacements in the steel main were effected. Electrification of trackage over the industrial area was carried out and arrangements made with B. C. Electric Railway Co. for operation. Industries on the island now receive exactly the same service as the mainland industries.

MINOR WORKS

A sounding survey has been made of the entire area of False creek from shore line to deep water, and a similar survey of Burrard inlet has been begun. Sixty miles of soundings had been run at the end of the year. An investigation was made as to the suitability of Spanish banks for booming ground purposes. A harbour map scale 200 feet to an inch is being completed. Range marks for navigating Coal Harbour channel were placed on Stanley park causeway, white by day and red lights at night. Five dolphins were placed to mark fairway between Granville and Connaught bridge in False creek.

REVENUE AND EXPENDITURE FOR YEAR ENDED DECEMBER 31, 1922

	\$	cts.		\$	cts.
Operating revenue.....	425,076	48	Operating expenditures.....	133,009	25
Surplus for year ended Dec. 31, 1922.....				292,067	23

RECORD OF SHIPPING FOR YEAR ENDED DECEMBER 31, 1922

COASTWISE

Number of vessels (local).....	15,619
Number of vessels (foreign).....	526
Total gross tonnage.....	8,734,858
Total net tonnage.....	5,464,645
Number of passengers landed.....	354,100
Number of passengers shipped.....	362,959

DEEP SEA

Number of vessels.....	504
Total gross tonnage.....	3,479,471
Total net tonnage.....	2,170,348
Number of passengers landed.....	11,092
Number of passengers shipped.....	13,501

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NEW WESTMINSTER HARBOUR COMMISSION

REVENUE ACCOUNT to December 31, 1922

RECEIPTS	\$	cts.	\$	cts.	\$	cts.
Jan. 1.—By balance in Bank of Toronto.....	1,787	08				
Dec. 31—By rental of water lots under lease.....	1,102	91				
Dec. 31—By harbour dues (contra).....		13 00				
					2,902	99
EXPENDITURES						
General expense—						
Telegrams.....	63	41				
Office supplies.....	31	88				
Postage.....		6 00				
Membership fee, Pacific Coast port authorities.....		10 00				
Legal and other professional services (from Jan. 1914 to June 1921).....	207	50				
Secretary's salary.....	120	00				
				438	79	
Poplar Island (Expense account)—						
Repairs and renewals.....	59	00				
Insurance premium.....	38	55				
Maps.....	40	72				
Annual rental under lease from Department of Indian Affairs.....	271	00				
Interest under agreement with N.W. Construction and Eng. Co.....	105	20				
				514	47	
Poplar Island (Capital account)—						
Principal sum under agreement with N.W. Construction and Eng. Co.....	1,000	00				
Cost of clearing upper portion of island, as per contract.....	650	00				
				1,650	00	
Harbour dues (contra).....				13	00	
						2,616 26
Balance in Bank of Toronto, Dec. 31, 1922.....						286 73

BELLEVILLE HARBOUR COMMISSION

STATEMENT of Disbursements for year 1922

Mar. 1	By check	Secretary Treasurer.....	\$	50 00
" 6	"	Geo. Dulmadge (harbour master) 3 months.....		225 00
May 15	"	" " 2 months.....		150 00
June 19	"	Hydro-Electric.....		22 26
" 22	Check.....			14 65
" 27	By check	Com. Exp. B.L. Hyman, expense to Montreal.....		49 20
" 27	"	Com. Exp. A. P. Allen, expense to Montreal.....		49 20
Aug. 3	"	G. Dulmadge (harbour master) 3 months.....		225 00
Sept. 1	"	Smith Hardware.....		24 55
" 14	"	G. Dulmadge (harbour master) 1 month.....		75 00
" 25	"	Com. Exp. B. L. Hyman, expense to Toronto and Ottawa.....		47 00
" 25	"	Com. Exp. A. P. Allen, expense to Toronto and Ottawa.....		47 00
Oct. 12	"	G. Dulmadge (harbour master) 1 month.....		75 00
" 12	"	H. Smith, lighting dock.....		90 00
" 12	"	Lease marsh land.....		10 00
" 12	"	Stamps.....		2 80
" 23	"	F. Fitzgerald audit.....		10 00
" 30	"	Hydro-electric.....		14 84
" 31	"	Geo. Dulmadge (harbour master) salary in full.....		22 50
Nov. 30	"	John H. Carr (harbour master) 1 month.....		75 00
Dec. 27	"	Hydro-electric.....		16 36
" 27	"	H. Smith, balance for lighting dock.....		33 00
" 22	"	Stamps.....		2 00
" 31	"	John H. Carr (harbour master) 1 month.....		75 00
Total disbursements for 1922.....				\$ 1,405 36

ICE PATROL SERVICE—CABOT STRAITS, 1923

The Ice Patrol Service maintained by this department in the Cabot straits, with a view to assisting vessels navigating these straits, and the gulf of St. Lawrence, was carried out this year by the Canadian Government steamers *Montcalm* and *Mikula*.

The patrol was maintained from cape Ray to Bird rocks—Bird rocks to vicinity of Heath point—Heath point back to cape Ray.

The C.G.S. *Montcalm* was engaged in this service from April 29 to May 29, and the C.G.S. *Mikula* from May 14 to June 12.

These vessels acted as the control stations for all ice information on the gulf route. Information as to ice conditions along the route from cape Race to Quebec was obtained, and passed on to steamers proceeding in and out of the gulf.

Besides performing the above valuable service, the following extracts, taken from the logs of these two steamers, show the number of vessels rendered assistance during that period:

Montcalm

- May 13—Assisted ss. *Domira* clear of ice.
- “ 14—Assisted ss. *Aasum* clear of ice.
- “ 15—Towed ss. *Epidauro* clear of ice.
- “ 16—Delivered provisions to ss. *Bedwyn*.
- “ 20—Pulled schooner *Spencer Lake* off Wood island and towed her to safety.
- “ 24—Assisted ss. *Nesbit Grammer* clear of ice.
- “ 26.—SS. *Laura Maersk* in distress, propeller broken, towed her to safety.

Mikula

- May 15—Assisted ss. *Glenbuckie*, ss *Ravenstone*, and ss *Bothwell* getting them clear of ice.
- “ 16—Assisted steamers *Lord Strathcona*, *Manchester Division*, *Key-state*, and *Sinista* getting them clear of ice.
- “ 17—Assisted ss. *Niels Fiisen* and ss *St. Stephen*, getting them clear of ice.
- “ 18—Got ss. *Bedwyn* clear of ice.
- “ 19—Assisted ss. *Cairndhu* and ss *Elmbay*, getting them clear of ice.
- “ 20—Assisted ss. *Elmbay* until forty miles N.W. half N. of Bird Rocks and ss *Marvale* as far as Cape Anguille.
- “ 21—Proceeded to assist ss. *Glenburnie* aground off Crabbs rock, Newfoundland. After taking information about her condition, ship standing by her all night.
- “ 22—Escorted ss *Glenbarnie* into St. George's harbour.
- “ 24—Assisted ss. *Brecon* clear of the ice.
- June 4—Assisted two schooners, *William C. Smith* and *Helen Vair*, towing them out of ice.
- “ 8—Escorting *Canadian Coaster* into bay of Islands on account of ice.

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PORT WARDENS' REPORTS FOR THE YEAR ENDED DECEMBER 31,
1922

Reports were received from 14 port wardens; 8 from Nova Scotia port wardens, 2 from Quebec port wardens, and 4 from British Columbia port wardens.

The total amount of fees collected at the port of Montreal amounted to \$16,218.37; at the port of Vancouver, \$8,215.55; at the port of Halifax, \$3,238; at the port of Quebec, \$1,819; and at the port of Sydney, N.S., \$1,301.

On April 13, Government steamer *Lady Grey* arrived at the port of Montreal reporting channel clear of ice between Quebec and Montreal; this was fifteen days later than last year.

On April 17, the ss. *Brumath* arrived at Montreal from Quebec, where she had wintered.

The first overseas arrival was the ss. *Bilbster* from Norfolk, Va.

The first departure from Montreal overseas was the ss. *Cornishman* for Liverpool and Avonmouth with general cargo and cattle; this was four days later than last year.

The last departure overseas from Montreal was the ss. *Lisgar County*, on December 2nd, two days earlier than last season.

The last departure from Montreal was the ss. *Grey Point*, with a cargo of sugar for Quebec, on December 15, three days earlier than last season.

The number of overseas ships reported at the Montreal office during the season was 928, aggregate tonnage 3,381,449 tons, an increase of 147 vessels and 809,754 tons over last season.

For the lower ports 230 vessels cleared, with an aggregate tonnage of 470,638 tons, an increase of 44 vessels and 116,253 tons over last season.

Total increase over last season 191 vessels and 926,007 tons.

There was a new departure in the shipment of minerals from the port of Montreal, three steamers leaving the port with full cargoes of Copper Matte, 16,352 tons.

Cement shipments also increased, 29,865 tons as against 14,864 last season, an increase of 15,001 tons.

During the year a number of vessels arrived with shipments of coal from Great Britain.

The depth of water in the Ship channel showed a slight increase over that of the past season until November 1. From that date till the close of navigation there was a decrease of about a foot as compared with the depth in 1921.

CASUALTIES BETWEEN MONTREAL AND QUEBEC

June 2—SS. *Montcalm* grounded near Champlain, refloated and dry-docked at Quebec.

July 1—Collision between ss. *Cairndhu* and tug *Spray*, four and a half miles above Sorel. Tug *Spray* sunk. *Cairndhu* no damage.

July 20—*Canadian Pioneer* grounded north bank, M175 buoy, refloated, surveyed, no apparent damage, proceeded on voyage.

August 11—Collision near Three Rivers, between ss. *Indochine* and ss. *Sarmatia*, both vessels damaged and beached, eventually refloated and repaired at Quebec.

September 15—SS. *Comino* aground, Isle Ste. Therese, refloated after lightening part cargo, surveyed, no apparent damage, reloaded and proceeded on voyage.

October 12—Collision between ss. *Izgled* and ss. *Orkild*, in St. Charles channel; both vessels damaged, surveyed and repaired at Montreal.

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October 15—SS. *Glenmoor* aground near Canada Cement wharf, coal laden; after lightening by discharge of part cargo, refloated and proceeded to berth, surveyed, no apparent damage.

October 17—SS. *Modica* grounded off Canada Cement wharf, after lightening by discharge of cargo, floated, proceeded to berth, surveyed, no apparent damage.

November 21—SS. *Cairndhu* ashore at Cap Rouge and refloated on 26th November, proceeded to Quebec for repairs.

REPORT OF PACIFIC SALVAGE COMPANY, LIMITED, VICTORIA, B.C.

SALVAGE OPERATIONS FOR THE YEAR ENDING MARCH 31, 1923

August 29, 1922.—SS. *Gray* ashore on Java reef. Recalled as vessel floated.

August 29, 1922.—SS. *Nika* ashore San Juan harbour. Proceeded assistance but vessel floated on our arrival. No operations.

August 29 to August 30, 1922.—SS. *Wabash* ashore twelve miles west Race rocks.

September 16, 1922.—Motorship *Anvil* ashore Kelp reef. Proceeded assistance but vessel floated on our arrival. No operations.

October 2 to October 5, 1922.—SS. *Empress of Australia*. Convoying from cape Flattery to Vancouver, B.C.

October 21 to December 7, 1922.—SS. *Guerrero* ashore five miles north Mazatlan, Mexico.

February 14, 1923.—SS. *Princess Alice* leaking after striking Morseby island. Victoria harbour.

February 14 to February 26, 1923.—Motorship *Coolcha* ashore at Albert head, B.C.

February 15 to February 16, 1923.—SS. *Santa Rita* ashore near Clo-oose, V.I. Ship broken up—no operations.

February 19 to March 3, 1923.—SS. *Tuscan Prince* ashore near Village island, V.I. Removed part cargo.

March 11 to March 14, 1923.—SS. *Sagadahoc* ashore Bellerock near Shannon point. Stood by—no operations.

REPORT OF SALVAGE SERVICES RENDERED BY THE QUEBEC SALVAGE & WRECKING COMPANY, LIMITED, FROM MARCH 31, 1922, TO MARCH 31, 1923

1922.

May 2.—British steamer *Canada*. Our diver examined propeller while steamer was lying afloat at breakwater. Propeller being damaged by striking submerged wreckage on her passage.

June 2 to 4.—Canadian Pacific Steamships, Ltd., steamer *Montcalm*. Grounded off Champlain, St. Lawrence river, our *Lord Strathcona* assisted re-floating her.

June 8 to 11.—Italian steamer *Salina*. Reported ashore Anticosti; we went to her assistance but were recalled as the *Salina* freed herself and did not sustain any serious damage and proceeded without assistance to her destination, Montreal.

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July 3 to August 4.—C.G.M.M. steamer *Canadian Commander*. Stranded St. Pierre, Miquelon, Newfoundland. We went to her assistance, refloated her, convoyed and brought her to Montreal, where we stood by with pumps until steamer was discharged and placed in dry dock.

August 5 and 6.—Norwegian steamer *Etna*. Touched bottom Saguenay river; steamer came to Quebec for diver examination and temporary repairs, which we performed after which steamer proceeded on her passage to Europe.

August 9 to 25.—H.M.S. *Raleigh*. Stranded off point Amour, strait of Belle Isle. Went to her assistance, stood by and did work according to conferences with Admiral. Our services, although to the entire satisfaction of the Admiral, were, owing to conditions of ship and prevailing weather, not further required.

August 26 to September 4.—British steamer *Baluchistan*. This steamer loaded from Montreal went ashore on White Island reef; we went to her assistance, refloated her and brought her to Quebec.

October 12 to November 4.—Italian steamer *Mongibello*. Ran ashore four miles west of South point, Anticosti. Went to her assistance. This steamer owing to water ballast being pumped out at time of stranding was swept as far in to the beach as she could go. Made several attempts with heavy beach gear, ships' anchors and *Lord Strathcona* without any success owing to lack of water due to constant strong westerly winds. Owners owing to lateness of season declined further assistance.

November 21 to December 3.—British steamer *Cairndhu*. This steamer loaded from Montreal, went ashore about five miles above Quebec bridge. We went to her assistance, refloated her, brought her to Quebec, stood by while discharging and until she went into dry dock at Lauzon.

The ss. *Lord Strathcona*, schooner *G.T.D.*, properly manned with all salvage gear, in good order, have been kept in commission during the season of navigation to proceed to any accidents or mishaps to ships at very short notice.

RETURNS OF SHIPPING MASTERS FOR THE YEAR ENDING DECEMBER 31, 1922.

NOTE.—The Collector of Customs acts as shipping master where no shipping master is appointed.

QUEBEC

Name of Port	Name of County	Name of Shipping Master	Seamen Shipped	Seamen Discharged	Amount
Chandler.....	Gaspe.....	Charles Innis.....	Nil	Nil	\$ cts.
Escoumains.....	Saguenay.....	J. B. S. Copping....	Nil	Nil	Nil
Gaspe	Gaspe.....	F. G. Eden.....	19	14	13 70
Grand Pabos.....	Gaspe.....				
Montreal.....	Hochelaga.....	I. O. Grey.....	7,335	7,726	6,640 00
Magdalen Islands.....	Gaspe.....	C. F. Painchaud....	Nil	Nil	Nil
Paspébiac.....	Bonaventure.....	E. W. LeGallais....	Nil	Nil	Nil
Percé	Gaspe.....	Phil. LaBoutellier..	Nil	Nil	Nil
Quebec.....	Quebec.....	T. Beland.....	816	678	660 10
Rimouski.....	Rimouski.....	Omer Beaulieu.....	Nil	Nil	Nil
St. Johns.....	St. Johns.....	J. C. Latour.....	Nil	Nil	Nil
Three Rivers.....	St. Maurice.....	W. D. Fisher.....	267	7	109 80
			8,437	8,425	7,423 60

RETURN OF SHIPPING MASTERS—Continued
NEW BRUNSWICK

Name of Port	Name of County	Name of Shipping Master	Seamen Shipped	Seamen Discharged	Amount
					\$ cts.
Albert	Albert	H. W. Crocker	Nil	Nil	Nil
Alma	Albert	H. O. Joyce	23	25	19 00
Baie Verte	Westmoreland				
Bathurst	Gloucester	C. J. Melanson	Nil	Nil	Nil
Chatham	Northumberland	R. J. Walls	19	14	13 70
Dalhousie	Restigouche	John B. Delaney	16	11	11 30
Dorchester	Westmoreland	F. M. Cook	Nil	Nil	Nil
Fredericton	Westmoreland		Nil	Nil	Nil
Grand Harbour	Charlotte	D. I. W. McLaughlin	Nil	Nil	Nil
Harvey	Albert	L. V. Bishop	Nil	Nil	Nil
Hillsborough	Albert		23	20	17 50
Lepreau	Charlotte	J. E. Haggerty	Nil	Nil	Nil
Musquash	St. John				
New Brandon	Gloucester				
Newcastle	Northumberland	John Russell	20	5	12 00
Riverside	Albert				
Rockport	Westmoreland				
Sackville	Westmoreland	F. W. George	Nil	Nil	Nil
St. Andrews	Charlotte	Thos. R. Wren	Nil	Nil	Nil
St. George	Charlotte	J. A. Skinner	15	12	11 10
St. John	St. John	W. H. Purdy	1,959	1,761	1,507 80
St. Martins (or Quaco)	St. John	R. Allan Love	22	9	13 70
St. Stephen	Charlotte	Andrew McWha	Nil	Nil	47 00
Shediac	Westmoreland				
Shippigan	Gloucester	J. L. Gauvin (Acting)	Nil	Nil	Nil
			2,097	1,857	1,653 10

NOVA SCOTIA

Advocate Harbour	Cumberland	E. C. Moore	Nil	Nil	Nil
Amherst	Cumberland	L. J. Moffatt	Nil	Nil	Nil
Annapolis Royal	Annapolis	Thos. M. Buckler	20	18	15 40
Antigonish	Antigonish	J. L. MacGillivray	Nil	Nil	Nil
Apple River	Cumberland	B. D. Mosher (Acting)	12	13	9 90
Arichat	Richmond	Chas. V. Herbin	Nil	Nil	Nil
Baddeck	Victoria				
Barrington	Shelburne	W. W. Gunn	Nil	Nil	Nil
Barton	Digby	F. W. Hutchinson	3	Nil	1 50
Bayfield	Antigonish	W. M. Strople	Nil	Nil	Nil
Belliveau Cove	Digby	E. E. Theriault	38	42	31 60
Bear River	Digby	J. L. Warren	16	26	15 80
Bridgewater	Lunenburg	C. N. Corkum	19	33	19 40
Canning	Kings	J. W. Miller	Nil	Nil	Nil
Canso	Guysborough	E. M. Hurst (Acting)	19	24	16 70
Church Point	Digby				
Clark Harbour	Shelburne				
Clementsport	Annapolis	H. L. Vroom	20	20	16 00
Cheverie	Hants	B. H. McLaughlin	2	3	1 90
Descousse	Richmond	Felix Landry	4	Nil	2 00
Digby	Digby	A. E. Cousins	55	31	36 80
Five Islands	Colchester	H. E. Fulmer	3	Nil	1 50
Glace Bay	Cape Breton				
Great Village	Colchester	J. A. Blaikie	Nil	Nil	Nil
Guysborough	Guysborough	H. M. Scott	Nil	7	2 10
Hawkesbury	Inverness				
Halifax	Halifax	H. S. Drake	4,488	4,069	3,464 70
Hastings	Inverness				
Hantsport	Hants	J. W. Lawrence	15	22	14 10
Havre Bouche	Antigonish	John Fraser	Nil	Nil	Nil
Isaac Harbour	Guysborough	W. G. MacMillan	15	5	9 00
Jordan Bay	Shelburne	E. Lyle Martin	3	Nil	1 50
Iahave	Lunenburg	E. M. Reinhardt	117	138	99 90
Liscomb	Guysborough	Wm. Hemlow	10	Nil	5 00
Little Bass River	Colchester	W. C. Lewis	4	3	2 90
Liverpool	Queens	W. A. Smith	128	52	79 60
Lockeport	Shelburne	J. R. Ruggles	31	19	21 20
Louisburg	Cape Breton	W. W. Lewis	69	55	51 00
*Lunenburg	Lunenburg	William Shupe	535	441	617 30
Mahone Bay	Lunenburg	T. F. Mader (Acting)	11	21	11 80
Mainadieu	Cape Breton		Nil	Nil	Nil
Maitland	Hants	R. Macdougall	Nil	Nil	Nil
Margaretsville	Annapolis	S. O. Baker	Nil	Nil	Nil
Margaree	Inverness	F. A. MacLeod	Nil	Nil	Nil

*Shipped 55 fishing crews.

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RETURN OF SHIPPING MASTERS—*Continued*NOVA SCOTIA—*Concluded*

Name of Port	Name of County	Name of Shipping Master	Seamen Shipped	Seamen Discharged	Amount
					\$ cts.
Merigomish.....	Pictou.....	T. B. Olding.....	Nil	Nil	Nil
Meteghan.....	Digby.....	L. T. Melanson.....	29	24	21 70
New Campbellton.....	Victoria.....	W. R. McKinnon.....	Nil	Nil	Nil
North East Harbour.....	Shelburne.....	G. B. Swaine.....	Nil	Nil	Nil
North Sydney.....	Cape Breton.....	M. J. Ross.....	279	278	222 90
Parrsboro.....	Cumberland.....	C. Cook.....	240	212	183 60
Pictou.....	Pictou.....	W. E. Jones.....	66	68	53 40
Port Greville.....	Cumberland.....	B. L. Hatfield.....	46	47	39 20
Port Hawkesbury.....	Inverness.....				
Port Hastings.....	Inverness.....	Geo. L. MacLean.....			
Port Hood.....	Inverness.....	G. Chisholm.....	Nil	Nil	Nil
Port Latour.....	Shelburne.....	W. C. Nickerson.....	Nil	Nil	Nil
Port Lorne.....	Inverness.....				
Port Medway.....	Queens.....		4	5	3 50
Port Morien.....	Cape Breton.....				
Port Mulgrave.....	Guysborough.....	M. J. Keating.....	2	4	2 20
Port Wade.....	Annapolis.....	R. R. Hayden (Acting).....	Nil	Nil	Nil
Port Williams.....	Kings.....	J. R. Starr.....	Nil	Nil	Nil
Pubnico.....	Yarmouth.....				
Pugwash.....	Cumberland.....				
River Hebert.....	Cumberland.....	J. F. Moffat.....	Nil	Nil	Nil
Riverport.....	Lunenburg.....	E. Wentzell.....	11	6	7 30
St. Anns.....	Victoria.....	D. M. MacAskill.....	Nil	Nil	Nil
St. Peters.....	Richmond.....	C. M. Morrison.....	4	5	3 50
Salmon River.....	Digby.....	F. P. Deveau.....	Nil	Nil	Nil
Sheet Harbour.....	Halifax.....	Robt. Wall.....	5	1	2 80
Shelburne.....	Shelburne.....	A. C. Bruce.....	13	3	7 40
Sherbrooke.....	Guysborough.....	Jas. MacDonald.....	8	7	6 10
Spencers Island.....	Cumberland.....	Geo. D. Spicer.....	1	Nil	50
Sydney.....	Cape Breton.....	V. Mullins (Acting).....	407	361	311 80
Thorne Cove.....	Annapolis.....				
Truro.....	Colchester.....				
Tatamagouche.....	Colchester.....	J. Ramsay.....	Nil	Nil	Nil
Wallace.....	Cumberland.....	A. D. Macfarlane.....	Nil	Nil	Nil
Walton.....	Hants.....				
West Arichat.....	Richmond.....				
Weymouth.....	Digby.....	A. H. Brooks.....	41	10	23 50
Windsor.....	Hants.....	A. H. Spence.....	39	46	33 30
Wolfville.....	Kings.....	P. W. Dandron.....	Nil	Nil	Nil
Yarmouth.....	Yarmouth.....	Geo. L. Wetmore.....	357	335	325 00
			7,189	6,454	5,796 30

PRINCE EDWARD ISLAND

Alberton.....	Prince.....	A. F. Hardy.....	Nil	Nil	Nil
Charlottetown.....	Queens.....	F. Beers.....	29	40	26 50
Crapaud.....	Queens.....	Neil Waddell.....	Nil	Nil	Nil
Georgetown.....	Kings.....	T. E. Morrissee.....	Nil	Nil	Nil
Malpeque.....	Prince.....				
Murray Harbour.....	Kings.....	H. A. Bell.....	Nil	Nil	Nil
Montague.....	Kings.....	E. Parkman (Acting).....	Nil	Nil	Nil
Pinette.....	Queens.....	J. D. McDonald.....	Nil	Nil	Nil
Port Hill.....	Prince.....				
St. Peters.....	Kings.....	J. J. McKinnon.....	Nil	Nil	Nil
Souris.....	Kings.....	A. C. Currie.....	Nil	Nil	Nil
Summerside.....	Prince.....	M. L. Bradshaw.....	Nil	4	1 20
Tignish.....	Prince.....	W. A. Gaudet.....	Nil	Nil	il
			29	44	27 70

BRITISH COLUMBIA

Aboucet.....	Comox-Alberni.....	J. L. Miller (Acting).....	Nil	Nil	Nil
Clayoquot.....	Comox-Atlin.....	John Grice.....	Nil	Nil	Nil
Hesquiat.....	Comox-Atlin.....	Chas. Moser.....	Nil	Nil	Nil
Kyuquot.....	Comox-Alberni.....	A. Ellis.....	Nil	Nil	Nil
Masset.....	Comox-Atlin.....	James Martin.....	Nil	Nil	Nil
New Westminster.....	New Westminster.....	P. R. Peele.....	Nil	Nil	Nil
Prince Rupert.....	Atlin.....	E. McCoskrie.....	473	519	392 20
Tofino.....	Comox-Atlin.....	E. W. Abraham.....	Nil	Nil	Nil
Vancouver.....	New Westminster.....	J. B. Campbell.....	5,856	5,805	4,669 50
Victoria.....	Victoria.....	Geo. Kirkendale.....	1,608	1,454	1,240 20
			7,937	7,778	6,301 90

RETURN OF SHIPPING MASTERS—*Concluded*
RECAPITULATION

	Seamen shipped	Seamen discharged	Amount
			\$ c.
Quebec.....	8,437	8,425	7,423 60
New Brunswick.....	2,097	1,857	1,653 10
Nova Scotia.....	7,189	6,454	5,796 30
Prince Edward Island.....	29	44	27 70
British Columbia.....	7,937	7,778	6,301 90
	25,689	24,558	21,202 60

LIVE STOCK SHIPMENTS

List of live stock shipped to ports in Great Britain and France during the year 1922.

MONTREAL

Months	Sheep	Horses	Cattle	United States Cattle
May.....			5,424	4,425
June.....			5,304	2,903
July.....			2,785	287
August.....			3,774	
September.....			1,707	
October.....			1,527	
November.....		4	1,340	
		4	21,861	7,615

ST. JOHN

January.....			458	
February.....			Nil	
March.....			851	
April.....			1,153	
May.....			Nil	
June.....			"	
July.....			"	
August.....			"	
September.....			"	
October.....			"	
November.....			"	
December.....			"	
			2,462	

HYDROGRAPHIC SURVEY

REPORT OF W. J. STEWART, M.E.I.C.
CHIEF HYDROGRAPHER

The work of the Survey is carried out by the following branches:—
The Atlantic Coast Survey under Captain F. Anderson, using the steamer *Acadia*.

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The Lower St. Lawrence Survey under Mr. Charles Savary, using the steamer *Cartier*.

The Magdalen Islands Survey under Mr. R. J. Fraser, using the steamer *Bayfield*.

The Pacific Coast Survey under Mr. H. D. Parizeau, using the steamer *Lillooet* and the tug *Restless*.

Supervision of automatic gauges between Quebec and Port Arthur, under Mr. Charles A. Price.

Chart preparation, engraving and printing.

The cost of these surveys and divisions was during the season:—

Atlantic Coast.....	\$ 69,216 84
Lower St. Lawrence.....	61,422 96
Magdalen Islands.....	31,532 90
Pacific Coast.....	94,401 09
Automatic gauges.....	14,375 84
Headquarters, miscellaneous.....	31,114 29
Total expenditure.....	\$ 302,063 92

The steamer *Acadia* was fitted out in the dockyard at Halifax in the spring of 1922 and commissioned on the 22nd of May. The first half of the season was taken up in off-shore sounding off the south coast of Nova Scotia between Liscomb island and cape Canso to obtain necessary data for the completion of a chart that was started during the season of 1921-22. The soundings were extended from inshore banks for a distance of 20 miles to seaward, covering an area of 850 square miles, and 1,400 miles of linear sounding. All banks and shoals indicated by linear soundings were carefully examined and developed to obtain the least water on them.

In addition to this outside work the harbour of Canso was traversed and sounded during periods when the weather was not suitable for the more exposed work.

As an indication of the weather, in which surveying operations were much hindered, it is interesting to note that for the period between the 22nd of May and the 18th of August, 88 days, only 23 of them could be used in off-shore sounding, this makes operating off this shore both slow and costly.

Advantage was taken of the presence of a well-equipped survey vessel such as the *Acadia* being in the locality of Glasgow head to calibrate the direction-finding stations there and furnish much needed constants to be applied to the bearings, particularly in the entrance to the strait of Canso.

Upon the completion of this work in the vicinity of cape Canso the steamer was moved on the first of September to cape Sable to re-sound the area off-shore between Lurcher light-ship and Negro harbour, and test reports that had been made as to the inaccuracy of the old soundings in this neighbourhood. Soundings were carried from twenty to forty miles off-shore over an area of two thousand square miles through sixteen hundred linear miles. The thirty and fifty fathom contours and several uncharted shoals are now accurately marked for the new chart.

The survey has shown that for the preparation of Admiralty charts too few soundings were obtained to delineate the banks and the deep water between them so that masters of vessels navigating in heavy weather were often at a loss to pick up their positions from soundings. It is hoped that the new work will greatly benefit navigation under these conditions.

During periods when weather conditions prevented off-shore sounding, a survey of Yarmouth harbour was carried out.

In this locality a great deal of fog was experienced; of the period between the 1st of September and the 8th of November (69) days, only 22 days could be used for off-shore sounding.

For the first time on this survey an attempt was made to utilize the direction-finding stations at Red head, St. John, N.B., Bar harbour, Maine, U.S., and Chebucto head, N.S., to locate off-shore soundings, but owing to the distance of the stations results were not entirely satisfactory for the accurate location of the ship. The personal equation of the operator appeared to enter into this work to such an extent that it was found difficult to get constant correction. These stations however were calibrated off cape Sable and the results furnished will assist in correcting the bearings in this direction.

The staff of this Survey consisted of Assistant Hydrographer H. L. Leadman, and Junior Hydrographers R. W. Bent and R. A. Rogers, all of whom deserve credit for their close attention to duty and furthering the best interests of the Survey.

I regret to say that the close of the year saw the latter officer taking up another position in the Government Service.

As a result of the seasons work, the following charts will be issued:—

Coast sheet: Cape Canso to Liscomb island.

Plan of Yarmouth harbour.

To place the information obtained in the re-survey of the coast of cape Sable, the soundings obtained were supplied to the Admiralty for the improvement of their chart No. 352, but these will be issued in a Canadian chart as soon as sufficient information is obtained.

Upon completion of the surveying season the ship was recommissioned and Captain Robson, her Sailing Master, was instructed to keep in touch with various harbours between cape Sable and Halifax during the winter to keep them as free as possible from ice. This work started about the 20th of December and continued until the 16th March, when the rudder-stock was so badly damaged that further work was impossible. The weather proved unusually severe, making ice-breaking rather too heavy for a vessel of the *Acadia's* build. She is built forward so that she can run up on ice and bear through it with her own weight, but to hammer at sheet ice with her style of bow is likely to lead to disaster.

LOWER ST. LAWRENCE

This branch of the Survey operates at the present time between Gaspé and Seven islands, and around the shores of Anticosti island. The party, under Mr. Charles Savary, was composed of Assistant Hydrographer Edouard Ghysens, and Junior Hydrographers L. T. Bowes, J. L. Foreman and F. C. G. Smith.

Before commissioning the vessel a short period was taken up in triangulation work to more accurately fix, on existing charts, the channel north of Orleans island.

The steamer received her spring overhaul at Quebec and was commissioned on the 16th of May.

Mr. Savary detailed a small party under Mr. Ghysens and Mr. Smith to Seven Islands, to make a detailed survey of that important harbour.

This party completed its work by the 15th of October, when it returned to Quebec and disbanded.

As a result of this work, a new chart of the bay of Seven islands is now in the hands of the King's Printer and will be issued at the opening of navigation.

Mr. Savary spent the season surveying off the northeast coast of the Gaspé peninsula between cape Magdalen and cape Rosier and around the west end of Anticosti island, sounding carefully the deep water channel between.

He has prepared large scale plans of various small harbours such as Magdalen river and bay, Cloridorme bay, Fox river, Griffin cove and Gaspé basin.

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In this connection several shoal spots were developed, and their positions accurately determined to enable the Marine Department to prepare Notices to Mariners on the subject.

The party returned to Quebec on the 25th of October, the steamer was laid up and the crew paid off.

MAGDALEN ISLANDS

With regard to the water around these islands no work was done during the season of 1922 because much needed repairs to the *Bayfield* could not be undertaken for lack of funds.

Under these circumstances the party was moved to Miramichi bay where a resurvey started in 1921 was taken in hand and completed, using a motor-launch and camping ashore. The party arrived on the ground on the 30th of May and the work was completed on the 19th of August, during which time 570 miles of boat-sounding were completed as well as 76 miles of coast-line surveyed. The outer and inner bays were sounded and the shore-line surveyed from Escuminac and Neguac gully lights to the mouth of the Miramichi river between Oak and Quart points.

It is intended to make a chart of the Miramichi river as far as Chatham, using the plans and surveys of the Department of Public Works to connect all work in the bay with Newcastle. For this purpose some triangulation work was carried out with a view to co-ordinating the two surveys and to properly locate the aids to navigation in the river. The preparation of a chart resulting from this work is now in hand.

It was intended upon the completion of the work in Miramichi bay to undertake some work at Caraquet, bay of Chaleur, but upon arrival of the party in this place, and before work could be undertaken, it was decided to do some work in the Richelieu river so that the plans of the Department of Public Works could be grafted into a modern chart of that river. Mr. Fraser and his assistant Mr. Wilson were therefore moved to St. Johns, P.Q., and made a triangulation of the river from lake Champlain to the St. Lawrence, locating permanent objects and other objects in the district, the buoys and lighthouses and other aids to navigation in the river. The survey is tied to the international boundary monuments at the foot of lake Champlain, two Geodetic Survey stations and a number of church spires whose positions had already been established, and to the river triangulation in the St. Lawrence at Sorel.

As a result of this work two sheets showing the whole river have been prepared and are in the hands of the engraver, being prepared for publication.

PACIFIC COAST

Work on the Pacific coast is carried on from the steamer *Lillooet* and the small tug *Restless*, the former being in charge of Mr. H. D. Parizeau, and the latter in charge of Commander J. H. Knight, R.N.

Both vessels received their spring overhaul in the Dockyard at Esquimalt and were commissioned on the 18th of April. The *Lillooet* left Esquimalt on the day she was commissioned, and proceeded to Vancouver to assist the officers of the Department of Public Works in the location and removal of several boulders from the shallow spots in First narrows, Burrard inlet. This work was completed on the 28th of the month and has given to the available depth of the narrows from three to four feet. The location of the boulders was determined by the sweeping apparatus supplied to the survey vessel and without which, work could not very well have been carried on.

After coaling at Ladysmith, a call was made at port Harvey to locate a shoal recently reported by Captain Stahlberg.

Between the 2nd and the 10th of May a survey was made of Allison harbour and approaches, and on the latter date two shoals in Christie passage were located and examined.

On the 15th of May, after calling at Ocean Falls for water and provisions, a resurvey of the water west of Aristazabel island was undertaken under unfavourable conditions of weather and continued for two weeks.

Between May 22 and June 2, a survey of Lockeport harbour, Klunkwoi bay and the channel from Shuttle island, Queen Charlotte islands, was undertaken and the location of several isolated rocks in the neighbourhood definitely settled.

Between the 2nd of June and the 31st of July some incomplete work in Hecate strait was taken in hand that Canadian chart No. 314 might be completed. On the 4th of August work was resumed in the neighbourhood of Aristazabel island, a camp party being established on Borrowman bay and work carried on simultaneously from it and the ship until the middle of September.

Owing to the very exposed nature of this coast work was carried on with the greatest difficulty. The ground is very uneven, the shoals very small, fog and rain are very common and the tide-rips very dangerous.

Between the 16th of September and the 10th of October triangulation was carried on to connect Aristazabel island with the main triangulation in Hecate strait at Bonilla island.

Between the 11th and 18th of October a resurvey was made of Kagan bay at the head of Skidegate inlet.

On the 23rd of October the season being too late for work out on the exposed coast, Mr. Parizeau joined Commander Knight in the resurvey of Johnson strait and Gunboat passage, and on the 6th of November both vessels left for Malaspina inlet, which was surveyed between the 11th and the 23rd of November.

The ships reached Esquimalt on the 25th of November and the crews were paid off.

During the season 145 miles of main triangulation was carried out along the shores of Hecate strait, 59 miles of inside triangulation in inside channels, 1,200 miles of ship-sounding, and 450 miles of boat-sounding as well as 130 miles of coast-lining were accomplished during the season.

As a result of the season's work, First narrows, Vancouver harbour, has been made available to deeper draught vessels than hitherto. Plans of Allison harbour, Lockeport harbour, Kagan bay and Malaspina inlet, have been issued to the public.

In addition to the work carried out by Mr. Parizeau with the *Lillooet*, Commander Knight with the *Restless* has the following to report:—

After commissioning on the 18th of April, he took some necessary soundings off Victoria and on his passage to Ocean Falls, which he made his headquarters, he examined Humphrey rock in Tribune channel, finding that it has only three feet of water over it instead of three fathoms as shown on the chart. At Blunden harbour another rock was located and examined.

The main activity for the season was a resurvey of Johnson channel, which connects Fisher channel with Seaforth channel, and until this survey was made has been unused. It shortens the distance between these channels by about ten miles. It is anything but intricate, has deep water in it and is in every way suitable for navigation by the larger vessels.

Work was carried on in this channel between the 1st of May and the 23rd of October, when in conjunction with Mr. Parizeau, a survey of Gunboat passage, connecting Johnson with Return channel was undertaken, and completed

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by the 6th of November. This passage is not to be recommended for larger vessels but it is a distinct cut-off for smaller craft and, with a few buoys, has been made available.

Between the sixth and the 25th of November, Commander Knight worked in conjunction with Mr. Parizeau in a re-survey of Malaspina inlet.

During the season, nine isolated rocks, dangerous to navigation were found, their positions reported and Notices to Mariners issued as a result; 175 miles of coast-line were charted, and 350 miles of boat-sounding run.

On the whole, the *Restless*, being in less exposed waters, had much more favourable weather.

On board the *Lillooet* Mr. Parizeau had for his staff, Assistant Hydrographer J. U. Beauchemin (loaned from the Atlantic Coast Survey for the season), and Junior Hydrographers O. R. Parker, W. K. Willis, as well as Instrument Man J. B. T. Lewis, while Commander Knight had for his assistant, Junior Hydrographer L. R. Davies. All these officers take a great interest in the work that is assigned to them.

Upon the breaking-up of the Naval Service Department the *Stadacona* was handed over for surveying purposes. This boat, a sister ship of the United States Coast and Geodetic Survey Vessel *Pathfinder*, would no doubt be useful for surveying purposes on the Pacific coast.

Unfortunately funds were lacking for re-conditioning her and for placing a survey party on board, so that she was left with the Dockyard at Esquimalt.

There is no doubt that it is essential that more facilities be extended the Survey for re-charting the dangerous coast of British Columbia.

On account of the confidence mariners have in the work of the Survey, requests are continually coming in for more work. These cannot all be looked after and dissatisfaction occurs. This is very unfortunate; the British Columbia coast is especially dangerous, and every rock located and accurately charted is to some extent removed from the list of dangers. Hardly a month goes by but some vessel touches an unknown rock. If a grounding occurs under unfavourable circumstances there may be a large loss of life.

AUTOMATIC GAUGES

The duty of looking after the gauges in the St. Lawrence river and Great Lakes between Quebec and Port Arthur is vested in Junior Hydrometric Engineer Charles Price, with Messrs W. J. Miller, A. R. Lee, A. S. Matthewman and C. F. Hannington, as assistants.

In the river between Montreal and Quebec are ten automatic gauges all of which operate during the summer season, it having been found impossible to carry on during the winter, with ice and flood conditions in the river. There are between Montreal and lake Ontario sixteen automatic gauges, all of which are operated during twelve months of the year. In the Great Lakes are eleven automatic gauges, all of which except that at Port Dalhousie are operated the year round.

Automatic Water Gauges in Operation		From	To
Port Arthur.....	Lake Superior.....	July 4	Dec. 31
Michipicoten harbour.....	".....	Jan. 1	" 31
Sault Ste. Marie (above lock).....	St. Mary's river.....	" 1	" 31
Sault Ste. Marie (below lock).....	".....	" 1	" 31
Collingwood.....	Georgian bay.....	" 1	" 31
Isle aux Peche.....	Detroit river.....	" 1	" 31
Highway Island.....	".....	" 1	" 31
Port Colborne.....	Lake Erie.....	" 1	" 31
Port Dalhousie.....	Lake Ontario.....	April 3	" 20
Kingston.....	".....	Jan. 1	" 31
Prescott.....	St. Lawrence river.....	" 1	" 31
Upper lock 27.....	".....	May 18	" 31
Lock 25, lower.....	".....	Jan. 1	" 31
Upper lock 24.....	".....	" 1	" 31
Lower lock 23.....	".....	May 22	" 31
Upper lock 21.....	".....	June 1	" 31
Cornwall.....	".....	" 1	" 31
Summerstown.....	Lake St. Francis.....	Jan. 1	" 31
Coteau landing.....	".....	" 1	" 31
Coteau du Lac.....	St. Lawrence river.....	" 1	Dec. 31
Cedars (P.P.P.).....	".....	" 1	" 31
Cascades pointe.....	Lake St. Louis.....	" 1	" 31
Ste. Anne de Bellevue (above lock).....	Lake of Two Mountains.....	" 1	" 31
Pointe Claire.....	Lake St. Louis.....	" 1	" 31
Lachine.....	".....	" 1	" 31
Montreal.....	St. Lawrence river.....	April 25	Nov. 21
Longue Pointe.....	".....	" 27	" 20
Varennas.....	".....	" 21	" 20
Lanoraie.....	".....	" 25	" 16
Sorel.....	".....	Jan. 1	Dec. 31
Range light No. 2.....	Lake St. Peter.....	May 12	Nov. 17
Three Rivers.....	St. Lawrence river.....	April 19	" 15
Batiscau.....	".....	" 21	" 15
Cap a la Roche.....	".....	May 2	" 18
Neuville.....	".....	April 28	" 15

Twenty-eight are gauges of the Haskell type furnishing a graph of the variation of the water surface.

Eight are of the Gurley printing gauge type where the half-hourly readings are printed on a strip of paper.

Each type has its advantage but this office considers the Haskell type superior to the other as being more delicate and giving less trouble in its operation.

In addition to these gauges the Survey is indebted to the Toronto Harbour Commission for records from its automatic gauge. Owing to its connection with lines of levels there are constant corrections to be applied for transfer to the systems operated by this Department.

Owing to the filling-in of the portion of the harbour in the vicinity of the gauge located at Port Arthur it became necessary to make a change and a new position was taken up. The gauge was out of operation for eight months.

A new site also was taken up at Michipicoten harbour; the gauge was very much exposed and a good deal of difficulty was experienced in getting proper records, both because of the continual surges and to sand washing into the intake. This has been overcome. For the gauge at the upper end of the Soo canal a new station has been built for us by the Department of Railways and Canals and for this the Survey is very grateful.

Due to error in the elevation of the reference mark on the north shore of lake St. Peter, adjustment has to be made to the readings hitherto furnished by the gauge at lake St. Peter range light No. 2. A table of these adjustments is attached.

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At the request of the Department of Railways and Canals, Mr. Price assisted the officers of that Department in locating some gauges in the Ottawa river, Grenville canal, and other locations. An automatic gauge has been loaned them for this purpose.

The records obtained by this branch of the Survey now extend over a considerable period and are becoming so valuable that requests for the information we have on file continue to increase and to supply the very latest it is necessary to have the records as received from the various stations, tabulated at the earliest possible moment.

This keeps the staff quite busy and an increase should be made to it at once.

Attached to this report are tables giving the following:—

1. Monthly mean water surface elevations of the Great lakes for 1922.
2. Monthly mean water surface elevations of the St. Lawrence river for 1922.
3. Adjustments to be applied to water surface elevations on lake St. Peter, range light No. 2, for all statements issued previous to 1923.

DRAUGHTING ROOM

The work of the Draughting Room has been carried out under Mr. G. L. Crichton, with Messrs F. Delaute, A. J. Pinet, P. E. Parent, Henri Melancon, W. L. Andrew, and M. Cailloux, as assistants.

In addition to the compiling for preparation of general sheets on smaller scales than those issued immediately after surveys have been completed, the Draughting Room is responsible for the making of minor corrections to the charts being issued to the public. This entails a lot of work that has to be very carefully supervised. The work in the Draughting Room is increasing rapidly and the work of the surveys could be more efficiently handled and made more useful to the public if a larger staff of good competent draughtmen in this office could be obtained.

ENGRAVING ROOM

During the past season all the engraving of charts for this survey has been carried on in the office by Mr. W. C. Cunningham and his staff of four assistants. It has been found that this method works much more satisfactorily than any of those that have been tried, either by contract, or at the Printing Bureau. The Draughting Room and the Engraving Department are in close contact and consultations over the work can be carried out much more quickly and much more efficiently than has been experienced in the past.

During the fiscal year four (4) entirely new charts and twenty (20) new editions of old charts were issued to the Public, and 7,110 charts were sold. This number will be greatly increased during the present year as the demand has become unprecedented and unexpected.

With the end of the fiscal year I have again to express my appreciation of the good work that has been carried out by the members of the staff, almost without exception, and in this connection I would like to point out that the remuneration paid is not in keeping with the quantity and quality, and the importance of the work being done. At the present time the classification and organization is such that promotion is at a standstill. Almost every officer is at the top of his class and whilst the work is becoming more important and more valuable every year, he cannot receive just reward for his services. Under these conditions and as long as human nature is as it is, it is hard to expect officers to over-exert themselves in any work assigned to them. All men like to find that their exertions are appreciated, and with the small salaries paid, even to the Seniors, the most appreciated reward would be advancement and increase of pay.

MONTHLY Mean Water Surface Elevations of the Great Lakes, by Automatic Water Gauges during 1922

Gauge Locations		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
		Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet
St. Lawrence River	Prescott	243.77	243.70	244.06	245.09	245.47	245.66	245.88	245.46	245.00	244.60	244.17	243.71	244.71
	Upper Lock 27. . . . .	.....	.....	.....	.....	.....	244.39	244.64	244.21	243.71	243.25	242.79	242.27	.....
	Lower Lock 25.	226.31	225.50	226.62	228.47	228.98	229.23	229.55	228.96	228.26	227.69	226.99	226.21	227.73
	Upper Lock 24.	223.19	222.47	223.37	225.01	225.51	225.78	226.19	225.69	224.92	224.36	223.80	223.13	224.45
	Lower Lock 23. . . . .	.....	.....	.....	.....	.....	214.13	214.37	213.83	213.19	212.68	212.09	211.45	.....
Lake St. Francis	Upper Lock 21. . . . .	.....	.....	.....	.....	.....	201.93	202.08	201.64	201.07	200.58	199.98	199.40	.....
	Cornwall. . . . .	.....	.....	.....	.....	.....	153.77	153.95	153.56	153.14	152.81	152.36	152.50	.....
	Summerstown.	152.33	151.68	152.13	152.62	152.51	152.64	152.80	152.46	152.07	151.75	151.39	151.24	152.14
	Coteau Landing.	151.60	150.98	151.28	152.07	151.97	152.07	152.18	151.83	151.48	151.22	150.99	150.77	151.54
	Coteau du Lac.	134.28	133.29	133.80	134.84	134.69	134.84	135.00	134.58	134.16	133.81	133.46	133.32	134.17
St. Lawrence River.	Cedars (P.P.P.)	95.43	95.03	95.38	96.02	95.92	96.03	96.19	95.88	95.56	95.44	95.23	95.12	95.60
Lake St. Louis.	Cascades Pte.	70.40	71.19	70.61	71.70	71.34	69.86	69.44	68.79	68.29	67.93	67.59	68.16	69.61
L. of Two Mountains.	Ste. Annes.	70.98	70.62	71.17	75.25	75.44	72.37	71.17	70.37	70.18	69.95	69.96	70.04	71.46
Lake St. Louis.	Pointe Claire	69.25	67.95	68.41	71.02	71.04	69.53	69.07	68.39	67.90	67.50	67.25	67.70	68.75
St. Lawrence River.	Lachine.	67.82	66.33	67.01	70.22	70.05	68.53	68.05	67.29	66.77	66.40	66.08	66.31	67.57
	Montreal. . . . .	.....	.....	.....	.....	25.17	22.62	21.48	20.40	19.67	19.17	18.76	Till	21st
	Longue Pointe. . . . .	.....	.....	.....	.....	23.83	21.30	20.06	19.04	18.32	17.85	17.39	Till	20th
	Vareunes. . . . .	.....	.....	.....	.....	22.54	19.80	18.42	17.35	16.65	16.17	15.70	Till	20th
	Lanoraie. . . . .	.....	.....	.....	.....	19.55	17.12	15.70	14.62	13.92	13.48	12.92	Till	16th
Lake St. Peter.	Sorel.	16.22	17.15	18.56	20.64	18.88	16.66	15.27	14.25	13.58	13.12	12.78	14.28	15.95
Lake St. Peter.	Range Light No. 2 . . . . .	.....	.....	.....	.....	.....	15.79	14.22	13.07	12.38	12.07	11.64	Till	17th
St. Lawrence River.	Three Rivers. . . . .	.....	.....	.....	.....	16.70	14.58	13.03	11.83	11.15	10.90	10.48	Till	15th
St. Lawrence River.	Batiscan. . . . .	.....	.....	.....	.....	13.23	11.58	10.21	9.27	8.67	8.56	8.14	Till	16th
	Cap a la Roche. . . . .	.....	.....	.....	.....	10.28	8.97	7.76	6.90	6.52	6.42	6.01	Till	17th
	Neuville. . . . .	.....	.....	.....	.....	4.09	3.71	2.86	2.49	2.15	2.14	1.83	Till	14th

NOTE.—Prescott to Cornwall Inclusive—
Elevations are above Mean Sea Level and are referred to the U.S. Lake Survey datum of 1903 adjustment.
Summerstown to Neuville inclusive—
Elevations are above Mean Sea Level and are referred to the Department of Public Works Precise Levels.

MONTHLY Mean Water Surface Elevations of the St. Lawrence River, by Automatic Water Gauges during 1922

Gauge Locations		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
		Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet
Lake Superior.....	Port Arthur†.....	*	*	*	*	*	*	602.49	602.61	602.67	602.40	602.19	601.91	601.97
	Michipicoten H.t.....	601.44	601.28	601.22	601.38	601.91	602.15	602.43	602.60	602.67	602.43	602.28	602.08	602.06
St. Mary's River.....	Above Lock†.....	601.73	601.44	601.38	601.62	601.93	602.15	602.43	602.60	602.67	602.43	602.28	602.08	602.06
	Below Lock.....	601.05	600.81	600.66	600.96	601.46	601.77	602.09	602.27	602.25	602.09	601.86	601.67	601.58
Georgian Bay.....	Collingwood‡.....	580.60	580.66	580.92	580.77	580.98	581.01	581.21	581.13	580.91	580.57	580.38	580.66	580.82
	.....	579.36	579.16	579.20	579.83	580.20	580.43	580.58	580.48	580.23	579.92	579.60	579.30	579.86
Lake Huron.....	Goderich.....	579.41	579.21	579.29	579.90	580.29	580.48	580.62	580.53	580.31	580.00	579.65	579.30	579.92
	.....	573.68	573.02	573.71	574.78	575.01	575.22	575.25	575.09	574.94	574.42	573.92	573.73	574.40
Detroit River.....	Isle Aux Peche.....	573.08	572.61	573.11	574.01	574.31	574.58	574.64	574.44	574.32	573.78	573.24	573.11	573.77
	Fighting Island.....	571.51	570.99	571.04	572.25	572.52	572.66	572.55	572.27	572.00	571.73	571.43	570.98	571.83
Lake Erie.....	Port Colborne.....	.....	.....	.....	246.13	246.62	246.77	246.98	246.56	246.11	245.59	245.07	244.76	Till 19
	Port Dalhousie.....	244.90	244.85	245.29	246.18	146.71	246.83	247.04	246.63	246.17	245.67	245.20	244.77	245.85
Lake Ontario.....	Toronto "A".....	244.70	244.64	245.01	245.99	246.46	246.64	246.86	246.44	245.92	245.49	245.00	244.54	245.64
	Kingston.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

"A"—Records taken by Toronto Harbour Commission.

* Mean of one staff gauge reading each day.

† Levels controlled by operating dam at outlet of lake—

Elevations are above Mean Sea Level and are referred to the U.S. Lake Survey datum of 1903 adjustment.

‡ Lowest recorded monthly mean of lakes Huron-Michigan..... 578.81
" " Erie..... 570.79
" " Ontario..... 243.80

ADJUSTMENTS to be Applied to all Water Surface Elevations of Lake St. Peter,
at Range Light No. 2, issued previous to 1923.

Year	Amount of Adjustment
1914.....	None
1915.....	None
1916.....	Plus 0.27 of a foot.
1917.....	Plus 0.44 of a foot.
1918.....	Plus 0.39 of a foot.
1919.....	Plus 0.41 of a foot.
1920.....	Plus 0.58 of a foot.
1921.....	Plus 0.59 of a foot.

TIDAL SURVEY

REPORT OF DR. W. BELL DAWSON, F.R.S.C., SUPERINTENDENT, TIDAL AND
CURRENT SURVEY. .

SURVEY OF TIDES AND CURRENTS

This Survey has carried on its work during the past year and made considerable addition to the tidal data available in Eastern Canada, as well as on the Pacific coast. In Eastern Canada tidal stations were established throughout the extent of Northumberland strait. On the Pacific coast the investigation of the currents in the region of Boundary pass was continued; this being the main route of navigation from Vancouver to the ocean. The principal tidal stations in Eastern Canada and on the Pacific coast have been maintained in continuous operation summer and winter. Some publication has also been issued which has been chiefly of a technical character, dealing with tidal questions. A considerable amount of investigation has been done to improve the methods by which the Tides and Slack Water Tables are calculated. The Superintendent of Tidal Surveys was in Europe during three months, from April to July, to attend an International Conference on oceanography in Rome. At this conference a number of questions of general interest were taken up, and technicalities discussed with the representatives of the International Hydrographic Bureau. There was also the opportunity of looking into the methods and appliances for tidal work at the Italian Istituto Geografico at Florence, and the Tidal branches of the Hydrographic departments in Paris and London.

Some problems of interest were also discussed at the recently established Tidal Institute at Liverpool, which will be helpful in carrying on tidal work in this country.

TIDAL OBSERVATIONS DURING THE SEASON OF 1922

Tidal stations were established during the season throughout the region of Northumberland strait, from cape Tormentine to the strait of Canso; the observations were thus simultaneous throughout this region, which is of distinct advantage. Tide gauges were placed at Arichat, Mulgrave, cape Jack, cape George, Pictou, Pugwash, Tidnish and Port Elgin in Baie Verte. One of the objects in view was to ascertain which localities could best be referred to Pictou and which of them to Charlottetown as Ports of Reference. A uniform system was also adopted for the low-water datum throughout this region, so that the rise of the tide will be consistent. The reduction of these observations has completed the information for Northumberland strait, which will now be

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published in the Tide Tables. The tidal stations in the strait of Canso also served for comparison with the observations of the currents in that strait, which were taken by Mr. H. W. Jones, who also had charge of the erection of the tide gauges and the supervision of the observations. A tide gauge was also placed at Campbellton at the head of Chaleur bay, early in the season at the beginning of May, to obtain the record of the freshet in the Restigouche river for comparison with the tide later on in the season when the river falls to its summer level.

Further observations were obtained at three localities in the Anticosti region in co-operation with the Hydrographic Survey. These were at Gaspé, Fox river and Ellis bay at the west end of Anticosti island. The observations thus obtained will be serviceable in a region which is somewhat difficult of access without a surveying steamer. Observations were also obtained at Ocean Falls on the Pacific coast, which is a new locality that has become an industrial centre.

An investigation has been carried on with the object of improving the Tide Tables for Quebec. From discussions at the International Conference, it would appear that the Harmonic Analysis is not satisfactory for estuary tides. The endeavour was therefore made to base the calculations for Quebec upon Father Point where the tide is still quite symmetrical in its character; the duration of rise and fall being equal. The Harmonic Analysis is quite applicable to this type of tide, and it thus affords predictions for Father Point which are entirely reliable. The tide at Quebec can then be deduced from Father Point by means of differences of time, those for Low Water being variable in three series in the periods of the moon's movements. The values for the various series of differences required in this calculation, are derived from five complete years of simultaneous observations. The method has the further advantage of enabling the influence of the spring freshet to be readily allowed for. The result will be a distinct improvement in accuracy; as the Tide Tables for Quebec have never been altogether satisfactory, especially in regard to the time of Low Water. It will be an important advantage to secure this improvement; because the tide at up-river points depend upon Quebec in their turn, and the advantage will thus extend throughout the tidal portion of the St. Lawrence. A paper explaining this method of dealing with estuary tides was read by the Superintendent at a conference in Washington which took place in the spring of 1923.

THE TIDES AND CURRENTS OF THE PACIFIC COAST

The observations of the currents throughout Boundary pass, which were commenced in the season of 1920 with a surveying steamer, have been continued during the season of 1922 by means of motor launches; and were carried on throughout the following winter until the spring of 1923. In using motor launches, the observations were necessarily limited to the time of the turn of the current; but the long series of observations obtained will afford an excellent basis for the calculation of Slack Water. These observations were obtained at East point of Saturna island, and at Turn point, which are the locations of most importance in the navigation of the pass. Observations were also obtained at Burrows island in Rosario strait, which were very satisfactory in explaining an unusual feature in the behaviour of the currents in these regions. It was found in Haro strait that the ebb was much stronger than the flood; whereas in Rosario strait these periods are reversed. This explains the general behaviour of the tidal streams between the ocean and the strait of Georgia, in showing that the flood and ebb streams take different routes between the islands of the Archipelago. This work was under the supervision of Mr. S. C. Hayden, as

well as the two tide gauges placed at Bedwell harbour and Fulford harbour, by which a record of the tide was obtained for comparison with the current.

The reduction of the observation of the currents to any practical basis has proved extremely difficult in this region, especially at Turn point where the passages branch in four directions, and the weakness of the flood stream because of its taking a different route, throws the time of Slack Water out of position. After considerable investigation it was found that low-water slack could be deduced from Sand heads in the strait of Georgia, whereas high-water slack has to be calculated from the tide of the open Pacific by means of a series of variable differences. The long series of observations affords a good basis for the values. At East point there is less difficulty, as both slacks could be deduced from the tide at Sand heads by constant differences. Tables of Slack Water for East point are published with the Tide Tables for 1923.

A further endeavour was made to obtain data for the turn of the current in the lower Fraser river; but the freshet in the river continued so late in the season that the current seldom turned. This condition is unusual and it is hoped in the following season that a better opportunity will be found of determining the time of Slack Water from New Westminster to the mouth of the river.

HUDSON BAY AND LABRADOR

The arrangements made with the Hudson Bay Company in the Spring of 1921 are being carried out; but so far, few of the results have been received. Two tidal stations were established on the eastern coast of the bay and a tidal station at Amadjuak in Hudson strait where development is reported to be going on with success. The only tidal record so far obtained from these stations is from Port Harrison, which affords the time and height of the tide at the only locality on a stretch of six hundred miles where this has yet been obtained.

The Tide Tables for Hudson bay have been separately published up to the present year; and the tidal data for the Labrador coast, including Hamilton inlet, have been included in this edition. The greater part of the references by which the time of the tide is found, are to Ports of Reference in the main Tide Tables. It has therefore seemed more convenient to embody the whole of this information in the Tide Tables for Eastern Canada, in which the Tables are found that the tidal differences are based upon. For the harbours in Hudson bay that are referred to ports in the North Sea, the data required are also explained.

Further observations at the mouth of Moose river are being obtained through co-operation with the engineers of the Temiskaming and Northern Ontario Railway. This will probably be the railway terminus on Jame's bay.

IMPROVEMENT IN THE TIDE TABLES

A special investigation has been carried out, based upon all material available, for the St. Lawrence estuary below Quebec. In the present Tide Tables, the rise of the tide is indicated by the mean amount at Springs and Neaps; and it was desirable to obtain a better means of arriving at the true rise on any day at each locality. To obtain this result, it was first necessary to make the low-water datum consistent throughout the river so that the rise at all points would be comparable. The investigation showed that the rise of the tide is complicated by an inequality in the height of the two tides of the day, and further that this inequality does not increase with the progress of the tide along the estuary in the same ratio as the general rise of the tide; but on the contrary it is nearly constant for long distances.

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For practical purposes, to give data which would be serviceable to mariners, it was therefore found best to use differences for height in the section of the estuary immediately below Quebec as far as Orignaux point. In the open estuary below this point, the rise can best be found by means of ratios based upon Father Point to which the tides are there referred. Diurnal inequality in the height has to be allowed for separately by a method which is explained in the Tide Tables, and which is simple in its application.

These ratios for the height of the tide have been extended from the mouth of the St. Lawrence along the north shore of the gulf from Mingan to Belle Isle strait. They have also been computed for the Gaspé coast and throughout Chaleur bay. The whole question of the height of the tide on 1,400 miles of coast is thus amply dealt with; and the data in the Tide Tables are re-arranged to correspond with this new information.

The further observations obtained in 1922 in Northumberland strait have enabled the tidal data for that region to be revised. The best dividing line between the harbours which are referred to Pictou and Charlottetown has been decided upon. The amount of rise of the tide at the various localities is also better determined, and the data for Low Water are made complete.

From the observations of 1921 at Buctouche, the complicated system of tides in the area which centres there, has been better explained in the Tide Tables. This will be of service to mariners where the rise of the tide is of consequence, in enabling them to cross the bars at the mouths of harbours in that region. The recent observations at the mouth of the Restigouche river have enabled the freshet conditions there to be explained in the Tide Tables.

At Cap à la Roche, which is the crucial point in the St. Lawrence river above Quebec, it has long been a baffling problem to obtain correct data for the tide: because the stage of the river varies during the season and also differs in different years. This raises and lowers the water surface on which the tidal undulation is superposed. The difference in the time of the tide from Quebec and its variation with the season is correctly known, and when the time at Quebec itself is made more accurate by the new method of calculation, Cap à la Roche will be benefited also. A method of dealing with the height of the tide has now also been found. There is a variation in level at Sorel which occurs during the lunar month; the level being higher at the Spring tides and lower at the Neaps. It was discovered, that after the extreme height of the freshet is over, this variation at Sorel is practically the same in amount and in character as the variation in the level of Low Water at Cap à la Roche. The unusual feature in the tide at that cape where the Neaps fall lower than the Springs, is thus found to accord with the variation at Sorel during the course of the month: and the same cause must be the origin of both effects, which points to an explanation of this anomaly. Because of this agreement in the two variations, it becomes possible to determine a difference in level between them which remains constant at any stage of the river during the summer season, after the freshet is over. In accordance with this principle, a rule can be given together with a Table which shows the variation in the range during the course of the month, that will enable mariners to find readily the available draught in that channel at any High Water or Low Water.

The information now obtained regarding the currents in Boundary pass and Haro strait, have enabled the behaviour of these currents to be definitely explained in the Tide Tables. The supplementary observations in Rosario strait have also afforded an explanation for the inequality in the strength and duration of the flood and ebb streams in the different passes. The time of Slack Water at East point and Turn point can also be found correctly from the data given in the Tide Tables. From the investigation of these complex currents, a method is indicated by which Slack Water at Turn point can be calculated; and the

observations there are being continued in order to obtain an adequate basis for this calculation. It will thus be possible to publish Tables of Slack Water for either East point or Turn point according to which may be of greater service to mariners. An investigation of these currents has long been desired, as Boundary pass is the main route of ocean navigation from Vancouver to the Pacific, as well as a pass which is much used by the lumber interests.

The above outline will indicate the leading directions in which investigation and research has been carried on during the year, based largely upon further observations of tides and currents.

PUBLICATION AND INFORMATION SUPPLIED

The two main editions of the Tide Tables for the eastern coasts of Canada and the Pacific coast have been prepared and issued as usual; as well as the three abridged editions for the St. Lawrence, bay of Fundy and the strait of Georgia. These abridged editions effect considerable saving in the cost of printing; and they are well circulated amongst fishermen who are dependent upon the time of tide for their catch. They serve also for local traffic. The special edition of the Tide Tables for Hudson bay has now been embodied with the Eastern Tables as explained. The total circulation of these Tide Tables now reaches sixty-six thousand five hundred (66,500) on the two coasts of Canada.

The new information obtained in Northumberland strait, the results of the investigation of the St. Lawrence and a description of the currents and passes of the Pacific coast have been communicated to the British Hydrographic Office. It thus appears in the British Tide Tables and navigators have the advantage of it on their first voyage to Canada, if they do not obtain our Canadian Tide Tables beforehand. The information will also appear in the Sailing Directions issued by the British Admiralty, which will give it wide publicity.

A considerable amount of information is supplied on request, the demand coming chiefly from engineers in other departments or in railway companies. The information most desired is for extreme tide levels, or the low-water datum required for dredging by the Public Works Department. Information on tide levels around the New Brunswick coast, from Chaleur bay to Buctouche, was supplied to the District Engineer of the Public Works Department at St. John. A request was also received from Dr. A. G. Huntsman of the Board of Marine Biology for details of observations of the current in the North-east angle of the gulf of St. Lawrence obtained during the Survey of 1896. These details including the under-current and wind record, were taken from the original note books as they have not been published in full. They will be of service in an investigation of fishing conditions and other marine life in that region.

In co-operation with the Hydrographic Survey, tidal observations have been obtained at two points on the Pacific coast and three other localities in the entrance to the St. Lawrence. The record thus obtained will be of immediate service in the reduction of the soundings and will afford more complete data for the tide in these localities. Mr. R. B. Lee of this Survey has supervised the erection of the tide gauges required in the Anticosti region, with the assistance of the Hydrographic surveying steamer for transportation. Some results which were required by the Hydrographic Survey for Chart purposes, have been worked out in the form desired, from tidal records recently obtained.

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RADIOTELEGRAPH SERVICE

REPORT OF C. P. EDWARDS, O.B.E., F.I.R.E., A.M.E.I.C., DIRECTOR.

GENERAL INFORMATION

Administration of Radio.—The activities of the Radio Branch comprise in the main:—

(1) Administration of the Radiotelegraph Act and Regulations issued thereunder.

(2) Construction and operation of Radio stations.

The administration of radio throughout the Dominion, as presented in the Radiotelegraph Act, chapter 43, Statutes 1913, has, with the establishment of the new Department of National Defence, been transferred from the late Department of Naval Service to the Department of Marine and Fisheries.

This administration comprises:—

(a) The licensing of all classes of Radio stations in Canada, including those on ships of Canadian registry, and on aircraft.

(b) The inspection of such stations to ascertain that they are equipped and operated in accordance with the Radiotelegraph Act and Regulations and with the provisions of their respective licenses.

(c) The examination, for Certificate of Proficiency in Radio, of the operating staffs of such stations.

(d) The inspection of all ships, Canadian and foreign, leaving Canadian ports, fitted with Radio, to ensure their compliance with the Radiotelegraph Act so far as it affects them, more particularly that section which prescribes that certain passenger ships must be equipped with an efficient transmitting and receiving equipment.

Construction and Operation of Government Stations.—The East Coast and Great Lakes System consists of 29 stations, forming a chain extending from Port Arthur to the Atlantic ocean. All these stations are owned by the department, 22 of them are operated by the Marconi Company under a contract whereby they receive a subsidy of \$5,500 per annum per station and retain all the tolls collected, with the exception of a small percentage which accrues to the department from the 8 stations on the Great Lakes and one station on the East coast. This contract expires in 1931.

The remaining stations are operated directly by the department as aids to navigation, 4 Direction Finding stations for giving bearings to ships, 2 light-ships, and one emergency station in the Halifax Dockyard.

On the Pacific coast the Government operates a chain of 8 stations extending from Vancouver (Point Grey) to Prince Rupert (Digby island). This chain gives service to ships at sea, and in addition provides the only means of communication with the Queen Charlotte islands. Incidentally service is also provided for 9 Private Commercial stations installed by the owners of lumber camps, canneries, paper mills, etc., on the British Columbia coast to connect with the Government chain.

The two stations installed at Port Nelson and LePas in 1914 were closed down when construction on the Hudson Bay railroad ceased in 1918. They have been out of commission since that date.

International Convention.—Canada subscribes to the International Radio Convention, which controls the International working of radio. One function of the Radio Branch is to see that all stations are operated in accordance with the regulations of this convention, and another to act as intermediary in the settlement of all International radiotelegraph accounts of Canadian ships and stations.

Imperial Chain.—The question of an Imperial chain of government-owned high-power radio stations to inter-connect the different dominions of the Empire together and at the same time with the United Kingdom, has long been receiving consideration. The policy of the Canadian Government has not changed materially and in a discussion of the question with the Imperial authorities in London in October, 1922, Canada, represented by the Honourable Ernest Lapointe, advised the British Government that in so far as Canada was concerned, the time was not considered opportune for the installation of high-power Government-owned stations in Canada, and that so long as Canadian commercial companies are prepared to install adequate high power radio stations and give first class service under our existing license system, it did not appear necessary for the Government to enter this field. This policy dates back to 1902, when the administration of the day, realizing the potential value of a trans-atlantic radio service, subsidized the affiliated Marconi Companies to erect the first trans-atlantic station in the world at Glace Bay, N.S. This station was duly established, and, while improved practically out of recognition in the matter of apparatus and efficiency, is in operation to-day and giving service to the Canadian people.

Licenses have been granted to the Canadian Marconi Company by the Department for the installation of super high-power stations at Montreal and Vancouver, the Vancouver station to work with Australia and the Orient, and Montreal with Europe. Vancouver will form the connecting link between Australia and the high power station in the United Kingdom, working either directly, or in times of bad conditions, by relay through Montreal.

Direction Finding Stations.—Any improvement in "aids to navigation" is of vital interest to the Dominion, and the adoption of the Radio Direction Finder to this end has been utilized to the fullest extent in connection with Canada's "Aids to Navigation" service. The existing four Direction Finding stations which are owned and operated by the department, have been in operation on the East coast for the past four years and have proved a valuable aid to navigation. These stations observe the bearing of a ship from the shore and wireless it back to the navigator.

New developments along these lines are being encouraged and followed, and next year two new Direction Finding stations, one at St. Paul Island, N.S., and one on the West coast of Vancouver island will be installed. It is also proposed to convert the existing Cape Sable, N.S., station into a Direction Finding station.

Radio Beacon Stations.—A later development in direction finding is the installation of the Direction Finder apparatus aboard ship instead of on shore. To meet this two experimental automatic radio fog alarm or radio beacon stations will be installed on the East coast, one at cape Ray, Nfld., and the other at a point yet to be determined. This radio fog alarm apparatus has been specially designed and built by the department and is so arranged that when the ordinary sound fog alarm machinery is started up, the radio alarm signal automatically operates and continues until the plant is shut down. These stations have a range of approximately 50 miles, and ships fitted with direction finding apparatus take their bearings therefrom. Should this new development demonstrate its utility, a considerable extension of the same may be anticipated.

Radiotelephone Broadcasting.—One of the notable developments of the year, and from the public standpoint the most interesting, is the application of the radiotelephone to broadcasting. This interest is reflected in the number of broadcasting licenses issued, a total of 62 having been granted during the year. These broadcasting stations vary in range from local stations with a radius of 10 miles to those with a radius of 250 miles.

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The wavelength band reserved for broadcasting stations in the Dominion is 400-450 metres, no other radio work being allowed on this band of wavelengths in Canada.

The establishment of broadcasting stations has naturally resulted in a large increase in the number of private receiving stations, 9,954 private licenses having been issued during the current fiscal year.

To meet the large demand for this class of license arrangements have been made with the Postmaster General whereby the postmasters in the larger towns and cities of the Dominion now issue such licenses. The department is glad to take advantage of this opportunity of expressing its appreciation of the prompt and efficient co-operation it has received from the Post Office Department in this and all other matters.

The radio situation in the province of Manitoba is of interest. In this province the regular wire telephone service is operated as a provincial government monopoly, and on representations from that government, the Dominion Government has agreed to refer all applications for license for Radiotelephone stations (including broadcasting) in Manitoba to the Provincial Minister of Telephones, for endorsement, before issuing such licenses. This arrangement will be effective April 1, 1923, and will probably remain in effect for a year or more to give the experiment a reasonable trial.

The Manitoba Government is preparing to install a first-class Radiotelephone station in Winnipeg and will commence a regular broadcasting service on April 1, 1923.

The question of advertising as a source of revenue for broadcasting stations has been the subject of much discussion; it divides itself into two general classes, "Direct" and "Indirect". An example of direct advertising would be an automobile salesman renting a station for ten minutes to extol the virtues of his particular make of car. An example of indirect advertising would be a departmental store renting a station for an evening, putting on a first-class programme, and announcing its name and the fact that it was contributing the programme, before and after each selection. It has finally been decided to allow stations to undertake advertising service as an experiment, and by the end of the next fiscal year the department should be in a position to know whether advertising can be handled in such a way as to make it popular with the broadcast listener.

The matter of "toll broadcasting", that is to say stations which anyone can rent as they would a long distance telephone wire, has received consideration. Should there prove to be a demand for this class of broadcasting a new license, known as the "public commercial broadcasting license", will probably be established. These stations would preferably work in a wavelength of their own, and might have to be limited in number. They would accordingly carry a higher license fee than the "private commercial broadcasting" stations.

Interference between Canadian broadcasting stations has not proved serious. The stations in each area have worked together harmoniously and have arranged schedules so that only one station works at a time. There is a certain amount of interference from the many stations in the United States, but the problem is not considered insurmountable. It remains to be seen how the new arrangement of wavelengths in the latter country, which becomes effective May 15, 1923, is going to affect our stations. Heretofore no United States stations have been transmitting in the 400-450 metre band we are using.

The interference from ship stations, referred to above, using 300 and 450 metres, is an international matter and the question of an international reservation of a band of wavelengths for broadcasting would appear to be the only satisfactory solution, and until this is done good programmes will continue to be

spoiled by spark signals, to the intense annoyance of the broadcast listener. In the meantime the Department cannot do very much more than see that Canadian ships and stations keep off the broadcasting wavelengths during broadcasting hours and eliminate all possible interference from this source.

Local interference from amateur stations is also a serious question; the department has been slowly stiffening the regulations with regard to the use of spark and encouraging the use of continuous wave transmitters, which is considerably reducing this trouble. Nevertheless, as the proportion of broadcast listeners to amateurs becomes greater, it may be necessary at some future date to establish "silent hours" for amateur transmitters during the evening broadcast hours from 7.30 to 11 p.m.

The department is averse to doing this unless the situation absolutely compels it, and with the spirit of responsibility and co-operation which is being shown by the Canadian amateur associations in establishing voluntary silent hours, it is hoped that no such regulation will have to be established. As a matter of fact practically all of the cases of interference investigated by our inspectors indicate the source of the trouble to be either foreign ship stations or power line induction, with a few cases of irresponsible amateurs here and there. The latter are promptly dealt with when located, and in the event of repetition of the interference, after warning, their licenses are suspended.

Canada at the present time is the only country in the world in which the amateurs are allowed to operate broadcasting stations. In dealing with this question, the department considered there could be no objection to amateur broadcasting stations so long as their number was limited and they were properly operated. Regulations were accordingly issued providing for the licensing of amateur broadcasting stations to work on the special wavelength of 250 metres (well below the regular broadcasting band). The issue of such licenses is strictly limited to recognized Radio Clubs or Associations, and the normal range of the stations is limited to 25 miles. This innovation has proved popular and practically every Radio Club is taking out a license.

Amendments to Radio Regulations:

Fees for Licenses.—Effective June 30, 1922, the annual fees to be paid in respect of Radio licenses and certificates issued by the Minister of Marine and Fisheries have been amended as follows:—

1. Limited Coast station.....	\$ 50.00
2. Public Commercial station.....	50.00
3. Private Commercial Broadcasting station.....	50.00
4. Private Commercial Station.....	10.00
5. Experimental station.....	5.00
6. Amateur Broadcasting station.....	5.00
7. Amateur Experimental station.....	1.00
8. Private Receiving station.....	1.00
9. Technical or Training School station.....	5.00
10. Ship station.....	1.00

FEES FOR EXAMINATIONS

1. Extra First Class Certificate.....	\$ 5.00
2. First Class Certificate.....	2.50
3. Second Class Certificate.....	1.00
4. Third Class Certificate.....	1.00
5. Experimental Certificate.....	2.50
6. Amateur Certificate.....	0.50
7. Emergency Certificate, any class.....	5.00
8. Radiotelephone Certificate.....	2.50

Effective September 1, 1922, revised regulations were issued to provide for several new classes of licenses, etc., as follows:—

New Classes of Licenses.—Private Commercial Broadcasting station, Amateur Broadcasting station, Private Receiving station.

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Wavelengths.—Special wavelengths for these new stations have been assigned, and those for Amateur Stations using C.W. been considerably extended, as follows:—

Private Commercial Broadcasting station..	400-500 metres.
Amateur Broadcasting station.....	250 metres.
Private Receiving station.....	(Reception only).
Experimental station.....	175 metres (spark)
	275 metres C.W. and Radio-telephone).
Amateur Experimental station	175 metres (spark),
	150 metres |
	175 " | (C.W. and
	200 " | Radiotelephone)
	225 " |

Inspections.—The administration of the Radiotelegraph Act has been carried on as usual and no evasions or attempted evasions of Section 4 of the Act, calling for the compulsory equipment of Radiotelegraph apparatus on certain passenger steamers, have been reported.

Permanent inspectors are maintained at Victoria, Ottawa, Halifax, Montreal (summer) and St. John (winter). These inspectors, in addition to inspecting all ships and licensed stations in their district, also undertake the examination of operators for Certificates of Proficiency. All land stations are inspected at least once a year and all ships when they visit Canadian ports. The advent of broadcasting has thrown a large amount of additional work on the inspection staff.

The cost of maintaining a permanent inspector in each large town and city is, at the present time, out of the question. The Department is trying to solve this problem by making use of qualified amateurs to police the ether. One or two of these men are appointed "part time" inspectors in different localities and are paid a nominal salary of about \$15 per month. So far the plan is working out successfully and radio listeners are getting good protection at a very moderate expense.

Part time inspectors have been appointed at Winnipeg, Man., Windsor, Ont., London, Ont., Brantford, Ont., Hamilton, Ont., Toronto, Ont., Montreal, Que., Three Rivers Que., Quebec, Que., Charlottetown, P.E.I., and North Sydney, N.S., and their numbers will be augmented at other important centres at an early date.

Traffic and Traffic Accounting.—The service comprises the preparation, rendering and collection of accounts for commercial ship to shore and inter-station messages handled by the departmental stations, also the auditing, rendering and collection of international accounts to various operating companies and foreign administrations for radiotelegrams exchanged by foreign ships through Canadian coast stations, and by Canadian ships through foreign stations.

Traffic Handled.—The paid business handled via Canadian coast stations during the fiscal year was as follows:—

	Paid business between ships		Paid business between stations	
	Messages	Words	Messages	Words
East coast.....	30,953	479,773	18,063	455,431
Great Lakes.....	15,857	225,711	2,231	34,337
West Coast.....	16,710	236,902	64,968	1,268,939
Totals.....	63,520	942,386	85,262	1,758,707

The number of traffic accounts handled by the branch amounted to approximately 100,000, representing \$150,000.

OFFICIAL LIST OF RADIO STATIONS OF CANADA

The popular interest in radio caused a demand for a list of Radiotelegraph stations of the Dominion, and the department after reviewing the situation decided this demand was such as to give reasonable expectation that such a publication would be self-supporting.

The list has been printed in looseleaf form with an attractive cover and its general appearance and make up reflects great credit on the Printing Bureau, who looked after this part of the work. The price charged per copy is \$1, which includes the supplements which are issued about every three months to maintain the list up to date.

The cover itself can be used for future editions.

One feature of the publication of value to the broadcast listener is the special supplement giving an up to date list of Canadian and United States Broadcasting stations.

The list has been very favourably received by the public, approximately 2,000 copies having been disposed of.

STATIONS IN OPERATION

The total number of stations in operation in the Dominion and on ships registered therein, is as follows:

Coast stations.....	34
Direction Finding stations.....	4
Government Land stations.....	1
Government Ship stations.....	32
Licensed Ship stations.....	235
Licensed Limited Coast Stations.....	1
Licensed Public Commercial Stations.....	9
Licensed Private Commercial Stations.....	45
Licensed Private Commercial Broadcasting stations.....	62
Licensed Amateur Broadcasting Stations.....	8
Licensed Radiotelegraph Training Schools.....	18
Licensed Experimental Stations.....	51
Licensed Amateur Experimental Stations.....	1,449
Licensed Private Receiving Stations.....	9,954
	<hr/>
	11,903

(For further details, see "Official List of Radio Stations in Canada.")

OPERATION OF THE COAST STATION SERVICES

The total number of messages and words handled during the year were as follows:—

	Messages	Words
East Coast.....	127,278	2,423,156
Great Lakes.....	30,424	468,785
West Coast.....	154,030	2,574,757
Hudson Bay.....	Nil	Nil
	<hr/>	<hr/>
	311,732	5,466,698

The amount of business handled by the East Coast System shows a decrease from last year's business amounting to 28,561 messages, containing 335,141 words.

The Great Lakes System shows an increase of 7,732 messages with an increase of 121,562 words.

The West Coast System (operated directly by the Department) shows an increase of 5,469 messages containing an increase of 235,257 words.

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REVENUE

The total amount of revenue to the Government from traffic collected during the year amounted to \$40,045.04 as against \$54,161.76 in 1921-22.

	1922-23
East Coast.....	\$ 5,346 20
Great Lakes.....	221 66
West Coast.....	34,477 18
Total.....	\$ 40,045 04

The West Coast service shows a decrease of \$2,588.75, the Great Lakes an increase of \$57.11 and the East coast a decrease of \$11,585.08 on account of closing of the station at Barrington Passage, N.S.

Other Revenue:—

License fees.....	\$ 16,223 20
Examination fees.....	245 00
Total.....	\$ 16,468 20

Total Radio revenue.....\$ 56,513 24

Direction Finding Stations.—Bearings were given to ships by the four stations on the East Coast during the fiscal year as follows:—

Station	Bearings
Chebucto Head.....	2,559
Canso.....	2,084
Cape Race.....	3,939
St. John.....	1,229
Total.....	9,811

Inspections.—The number of inspections carried out during the fiscal year was:—

Coast and Land stations.....	26
Ship stations.....	2,305
Amateur Experimental stations.....	696
Total.....	3,027

Examination for Certificate of Proficiency in Radio.—Two hundred and fifty-nine examinations for Radio Certificates were held during the year including 59 re-examinations. 188 Candidates were successful and 71 failed.

Certificates.—A new certificate for operators to work Radiotelephone stations has been established and the operating speed requirements for the Amateur Experimental Certificate of Proficiency in Radiotelegraphy has been raised from 5 to 10 words per minute.

PERSONNEL

The personnel of the Radiotelegraph Service during the past year was as follows:—

Government Service—	
Headquarters.....	30
Coast stations.....	53
Land stations.....	51
Ship stations.....	9
	143
Commercial—	
Headquarters.....	144
Coast stations.....	102
Land stations.....	66
Ship stations.....	179
	491
Total.....	634

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ASSISTANCE RENDERED TO SHIPS DURING THE YEAR BY GOVERNMENT RADIO SERVICE

WEST COAST

Digby Island

SS. *Queen*.—At 7.02 a.m. on the 16th September, 1922, Digby Island received a distress message from the ss. *Queen* which ran ashore on White Cliff island at 6.47 a.m. in a dense fog. The distress call was answered by the ss. *Venture* and by this station almost simultaneously. The *Venture*, then at the mouth of the Skeena River, proceeded at once to the scene of the accident and removed the *Queen's* passengers to Prince Rupert. At 9.45 p.m. the *Queen* was refloated, the ss. *Admiral Rodman* standing by until that time.

SS. *Jefferson*.—At 11 p.m. on the 20th October, 1922, the ss. *Jefferson* lost her propeller off Lord rocks, Dixon's entrance, being in no immediate danger as weather calm, *Jefferson* later towed into Ketchikan by the U.S. Survey boat *Cedar*.

SS. *Princess Beatrice*.—At 4.32 a.m. on the 14th October, the ss. *Princess Beatrice* ran aground on Village island, Skeena river. No distress call was sent out as assistance not necessary, vessel being refloated on next tide, leaking slightly, and continued journey to Prince Rupert and thence to Vancouver.

Estevan Point

Fishing Vessel *Texas*.—At 8.30 p.m. on the 10th June, 1922, two fishermen landed at Estevan point in a dory from the fishing vessel *Texas*. They reported the *Texas* disabled with a broken shaft 25 miles S.W. of Kyuquot and requested assistance from the U.S. Cutter *Snohomish*. Estevan being unable raise *Snohomish* direct sent a message to the Captain through Tatoosh, advising nature of accident, position of vessel and requesting immediate assistance. At 8 a.m. on 11th June, Estevan got in touch with *Snohomish* and delivered message direct. *Snohomish* advised leaving immediately and reported abeam cape Beale 4.10 p.m. same date. *Snohomish* reached the *Texas* next day and towed her to Seattle. A telegram was sent to the owner at Seattle, reporting accident and action taken and advising that two of crew on board *Aurora* en route Seattle.

SS. *H. F. Alexander*.—At 12.28 a.m. on the 7th August, 1922, Estevan received a distress message from the ss. *H. F. Alexander* advising struck rock off cape Flattery in fog, believe it to be Cape rock. The S.O.S. and position were immediately broadcasted but no replies received. The *Alexander* later reported as being in no immediate danger, No. 1 hold full of water, others tight. The *Alexander* got in touch with U.S. Cutter *Snohomish*, who escorted her to Seattle.

SS. *Tomi Maru*.—At 6 p.m. on the 4th November, 1922, the ss. *Empress of Russia* reported the ss. *Tomi Maru* with damaged rudder, position Lat. 52.27 N, 156.23 W, approximately 1,050 miles from Estevan. The steamers *Tokoh Maru*, *Oridono Maru*, *Nankoh Maru* and *Empress of Russia* proceeding towards disabled vessel. The U.S. Cutter *Snohomish* requested particulars which were given by Estevan. The *Empress of Russia* advised later that she had resumed her course as the *Oridono Maru* was nearing the disabled vessel. On the 6th November the *Tomi Maru* effected temporary repairs and proceeded to Honolulu.

SS. *Bessie Dollar*, *Stuart Dollar*, Tug *Sea Monarch*.—At 11.36 a.m. on the 21st November, 1922, Estevan received a telegram from the Radio Division

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Superintendent at Victoria, B.C., stating newspapers report ss. *Bessie Dollar*, *Stuart Dollar* and Tug *Sea Monarch* in distress. This station had been in communication with the *Bessie Dollar* and *Sea Monarch* but had received no report of disability. Estevan immediately called the *Sea Monarch* who reported the following—main steam pipe of *Bessie Dollar* blown two days ago, one Chinaman killed and Chief Engineer slightly injured, crew endeavouring effect repairs. This information was telegraphed to Victoria. At 6.12 p.m. Estevan asked *Bessie Dollar* if in immediate danger and if repairs could be effected, vessel replied in no immediate danger, progressing favourably with repairs. When asked for position replied don't know, haven't seen sun for two days, but approximately 600 miles west of Flattery. At 8 p.m. gave position as 51.00 N, 138.40 W, drifting northwest. Estevan also asked *Sea Monarch* for particulars of herself and *Stuart Dollar* and was advised nothing wrong with them, everything going O.K., position approximately 440 miles west Flattery, *Sea Monarch* astern of *Stuart Dollar* acting as rudder. The *Sea Monarch* and *Stuart Dollar* later made port in company. The *Bessie Dollar* also made port, being escorted in turn by the ss. *Algonquin* and U.S. Cutter *Snohomish*.

SS. *Nika*.—At 5.06 p.m. on the 14th February, 1923, distress calls were heard at Estevan from the U.S. coast stations at Puget sound and Tatoosh advising ss. *Nika* with broken rudder 10 miles south of Umatilla Light. At 5.12 p.m. spoke the *Snohomish* going to assistance of *Nika*. At 7.10 p.m. *Nika* continuing send out distress calls at intervals very slowly; apparently no operator on board, as unable receive replies. Vessel now reported on fire. Crew rescued by *Snohomish*. *Nika* last reported aground off Ucluelet, B.C.

SS. *Tuscan Prince*.—At 4.55 a.m. on the 15th February, 1923, Estevan received a distress message from the ss. *Tuscan Prince* advising on the rocks, breaking up fast, stand by for position. Estevan answered call and immediately broadcasted the S.O.S. The ss. *Kewance* also heard the distress call and also broadcasted same. At 5.16 a.m. the *Tuscan Prince* transmitted her position, which Estevan was unable to read owing to bad interference by U.S. stations. At 5.20 a.m. Estevan continued broadcasting S.O.S. and calling the *Tuscan Prince* for position at intervals throughout the day, but no response. At 3.34 p.m. on February 16th Gonzales Hill advised Estevan that large vessel reported ashore Village island, Barclay sound. This report was transmitted to the *Snohomish*, *Algonquin* and *Sea Monarch*. The *Snohomish* with assistance of Bamfield Lifeboat rescued crew of *Tuscan Prince*. Vessel total wreck.

SS. *Santa Rita*.—At 5.25 a.m. on the 15th February, 1923, Estevan received a distress message from the ss *Santa Rita* advising no position, on rocks near Seattle, and later that ship was on rocks off Tatoosh. Estevan broadcasted the message and called ss. *Yokohama Maru* and *Kewance*, both vessels being in vicinity of Flattery. *Kewance* answered, "O.K., we are near straits and will look for him." No response from *Yokohama Maru*. 5.35 a.m. W/T set on *Santa Rita* out of commission. 6.00 a.m. *Santa Rita* advises won't sink, on rocks off Tatoosh, very rough. The *Sea Monarch*, *Algonquin* and *Snohomish* made search for this vessel, located by *Sea Monarch* about 3 miles north of Carmanah, ship breaking up. Crew taken from shore on board *Snohomish* and transhipped to Port Angeles.

Gonzales Hill

SS. *Gray*.—At 4.45 a.m. on the 29th August 1922, Gonzales Hill received a report from the Point Grey Station that the ss. *Gray* was aground on Java reef, Saturan island. No distress call transmitted by vessel. This informa-

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tion telephoned to Mr. Nickerson, of the Whaling Company, at 5.20 a.m. Arrangements made by Whaling Company with Pacific Salvage Company to send out the *Algerine*. *Algerine* ready leave at 8.15 a.m. when advice received from *Gray* that she had floated without assistance at 8.15 a.m.

SS. *Wabash*.—At midnight on 28th August, 1922, the ss. *Wabash* advised Gonzales Hill that she had gone ashore at 10.30 p.m., no assistance required as expected to float next high tide. No distress calls sent out. Salvage people advised in usual way and *Algerine* and *Leebro* left to offer assistance. *Wabash* hard aground 12 miles west of Race rocks and failed to float high tide, accepted assistance of salvage boats. Refloated 8.30 p.m. August 30th.

Motorship *Anvil*.—At 10.12 a.m. on September 16th, 1922, Gonzales Hill received a message from the motorship *Anvil* aground on Kelp reef, 300 yards from beacon, requesting assistance tug boat. No distress call sent out. Particulars given Pacific Salvage Company, who sent *Algerine* to assistance. *Anvil* floated at noon, a few minutes before arrival of *Algerine*.

SS. *Princess Alice*.—At 2.35 a.m. on February 14th, 1923, the ss. *Princess Alice* ran aground on Pelorus point. Vessel left Victoria at 11.45 p.m. on February 13th bound Vancouver, encountered blinding snowstorm en route. No distress calls sent out. First intimation was message for Captain Troup of the B.C.C.S.S. Company, filed on board *Princess Alice* at 3.15 a.m., received by Gonzales Hill at 3.15 a.m., and telephoned to Captain Troup at 3.16 a.m. Vessel returned to Victoria without assistance. Holds leaking.

SS. *Grace Dollar*.—At 8.15 p.m. on the 25th November, 1922, Gonzales Hill received a message from the ss. *Grace Dollar* addressed to the agent advising ashore in the Narrows. Message immediately telephoned and answer obtained and transmitted to ship. Further message received and telephoned. No further news was obtained from the ship, but the agent advised us that he went out to the *Grace Dollar* immediately in a tug and that she floated off at 11.27 p.m., returned to Vancouver harbour, and everything being satisfactory, sailed again at 4.00 a.m.

EAST COAST AND GREAT LAKES

SS. *Adriatic*.—On the 1st August, 1922, the ss. *Adriatic* broadcasted a distress message reporting an explosion having occurred on board. The Cape Race Station sent out a general call for help. The *Adriatic* continued her voyage, having suffered only slight damage.

SS. *West Hematite*.—On the 11th November, 1922, Cape Race received a distress message from the ss. *West Hematite* reporting boiler trouble, position 40.47 N. 39.57 W. Cape Race directed the ss. *City of Fairbury* to assist. The *West Hematite* was towed to port.

SS. *Montegrappa*.—On the 14th November, 1922, Cape Race received a distress message from the ss. *Montegrappa*, position 43.48 N. 48.41 W. The ss. *Pittsburg* assisted by taking the crew off the disabled vessel. The *Montegrappa* afterwards sank.

SS. *Henrichkayser*.—On the 6th December, 1922, Cape Race received a distress message from the ss. *Henrichkayser* reporting rudder broken, position 38.31 N. 62.12 W. A general call for assistance was sent out by Cape Race. The ultimate fate of the damaged vessel was not disclosed.

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SS. *Auguste Leblond*.—On the 7th December, 1922, Cape Race received a distress message from the ss. *Auguste Leblond* advising sinking in 48-20 N. 41-40 W. Cape Race sent out a general call for help. The disabled vessel sank after her crew had been taken off by the ss. *Niels Nielsen*.

SS. *Prospero*.—On the 16th December, 1922, Cape Race received a distress message from the ss. *Prospero* aground at Horse island. Cape Race obtained assistance from St. John's, Nfld., and the stranded vessel was later towed off.

SS. *Melpo*.—On the 17th December, 1922, Cape Race received a distress message from the ss. *Melpo* advising, steering gear disabled, position 49-00 N. 26-30 W. Cape Race sent out a general call for help and the disabled vessel was eventually towed to port.

SS. *Helda Norsk*.—On the 15th January, 1923, Cape Race received a distress message from the ss. *Helda Norsk* advising, struck a berg and leaking, position 47-39 N. 43-24 W. Cape Race sent out a general call for help. It was subsequently ascertained that the vessel had suffered only slight damage and had not required assistance.

SS. *Montella*.—On the 16th January, 1923, Cape Race received a distress message from the ss. *Montella* advising, sinking in 38-40 N. 56-50 W. Cape Race directed the ss. *Eastern King* to assist. The *Montella* sank, crew saved. The Louisburg coast station also received this message and advised the Marine Agent at Halifax.

SS. *Mapledawn*.—At 1.40 a.m. on the 25th April, 1922, the ss. *Mapledawn* reported to the Montreal Station that she was aground about 11 miles distant. A message was sent to the owners in Montreal asking for tugs to be sent out. The *Mapledawn* was refloated at 8.06 a.m. on same date. No distress call was sent out.

C.P.S. *Montcalm*.—At 4.20 p.m. on the 2nd June, 1922, the *Montcalm* reported to her owners through the Montreal Station that she was aground near Champlain. The *Montcalm* was refloated on the morning of June 4th. No distress call sent out.

SS. *Indo Chine*.—At 2.45 a.m. on the 11th August, 1922, the ss. *Indo Chine* reported to the Montreal Station that she had been in collision with the ss. *Sarnian* off Three Rivers, Que. The Harbour Master and Signal Service, Montreal, were advised. Nothing further transpired. No distress call sent out.

SS. *Cairndhu*.—At 8.10 p.m. on the 21st November, 1922, the ss. *Cairndhu* reported to her agents through the Quebec Station that she was ashore at Cap Rouge, 10 miles west of Quebec. The agents at once took steps to send necessary assistance and the vessel was refloated on November 28 at 2.30 p.m., and proceeded to Quebec for repairs.

SS. *Orthia*.—At 12.04 a.m. on the 5th July, 1922, Father Point received a distress message from the ss. *Orthia*, bound east, advising in collision with the ss. *Airedale* and sinking fast. This information was immediately telegraphed to the vessel's agents at Quebec and to the Marine agents at Quebec and Halifax, also broadcasted several times at short intervals. The *Airedale* stood by the *Orthia* and took off her crew. The *Orthia* declined assistance other than from the *Airedale* which also suffered serious damage and was obliged to return to Quebec for repairs. The *Orthia* was finally beached about one mile from the place of collision, off White Island Light.

SS. Babuchistan.—At 3.10 a.m. on the 26th August, 1922, the ss. *Babuchistan* went ashore at White Island shoals, seriously damaging her No. 1 hold and forepeak. Communication was established with Father Point and arrangements made for a tug to assist. Salvage work was carried out successfully and the vessel finally towed to Quebec for repairs.

SS. Salina.—On the 8th June, 1922, the Italian steamer *Salina* reported to Fame Point that she was aground in the vicinity of Heath point, Anticosti. At 11 a.m., request for a tug being made, Fame Point immediately advised the S.S.S. and Marine Agent at Quebec. The steamers *Cabotia* and *Charles Pratt*, 88 miles and 100 miles distant, respectively, were unable to establish communication with the *Salina*. It was afterwards ascertained that W/T receiving equipment of the *Salina* was out of order. At 8.30 a.m. on June 9 Fame Point intercepted a message broadcasted by the *Salina* confirming that the vessel was still afloat. The Signal Service and Marine Agency at Quebec were immediately notified.

SS. Mongibello.—In the early afternoon of the 12th October, 1922, Fame Point received a report from the ss. *Mongibello* ashore about 5 miles west of South point, Anticosti. No general call for assistance was sent out. At 9 a.m. on the 13th the vessel's position was the same with northwest gale blowing. At 10 a.m. October 14 reported position same and that tug sent to her assistance was returning, efforts to release her having failed.

SS. Canadian Commander.—On the 3rd July, 1922, at 7.37 a.m., the ss. *Canadian Commander* went ashore at Plate point, St. Pierre. Communication was immediately established with North Sydney, no distress call sent out. Salvage operations lasted until after the middle of the month, during which period the vessel was in communication with North Sydney.

SS. West Cresy.—At 10.18 p.m. on the 8th October, 1922, the ss. *West Cresy* called Clamperdown and reported "*West Cresy* lying anchored quarantine, afire in boiler room, please advise fire tugs, Harbour Master, and please be in readiness for further calls". This information was immediately telephoned to the Marine Agent, Halifax. At 11.05 p.m. the ship reported everything O.K., which information was telephoned to the Marine Agent.

SS. Nordfjeld.—At 2.40 p.m. on the 22nd November, 1922, Point Amour received a distress message from the ss. *Nordfjeld* reporting in a sinking condition in the vicinity of Flowers cove, on the south side of the straits of Belle Isle. The steamers *Alchiba* and *Canadian Commander* responded giving their positions 80 miles S.W. and 150 miles E. of Point Amour respectively. The latter vessel was unable to render assistance being unable to proceed on account of thick snow squalls. Point Amour heard nothing further from the distressed vessel until 8 a.m. on the 23rd when she reported being stranded on Flowers ledges. About this time the *Alchiba* and *Canadian Commander* reported to Point Amour that in answer to their flag signals the *Nordfjeld* stated that assistance was not required. No further signals were heard. On the 4th December the ss. *Sagona* reported that the vessel had been abandoned.

H.M.S. Raleigh.—At 3.40 p.m. on the 8th August, 1922, the H.M.S. *Raleigh* called Point Amour and advised that the vessel had grounded badly in some part of Forteau bay. No other signals were received and the first intimation the Point Amour staff had that the vessel's situation was precarious was when guns were heard firing towards the West. Shortly afterwards a messenger landed from the *Raleigh* bearing a request from the Commander that

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the S.O.S. signal be sent out. This was done and several ships immediately responded. About 7 p.m. the last of the crew landed and the Commander decided that no assistance was possible as the ship was being badly pounded by the seas.

SS. *Sarnian*.—At 9.20 a.m. on the 20th April, 1922, the Master of the ss. *Sarnian* reported by radio via Sault Ste. Marie to the owners in Montreal, that his vessel had stripped her propeller in the ice. At 4.30 p.m. on the 22nd April the Master advised the owners that repairs had been effected and that his vessel was proceeding. No distress call was sent out.

SS. *J. Frater Taylor*.—On the 24th April, 1922, the Master of the ss. *J. Frater Taylor* reported by radio via Sault Ste. Marie to his agent at the Soo, that his vessel had stripped her propeller in the ice during the night of April 23. At 12.25 p.m. the Master advised agent that repairs had been effected, vessel proceeding. No distress call sent out.

SS. *Sam Mitchell*.—At 9 a.m. on the 1st July, 1922, the Master of the ss. *Sam Mitchell* sent a message through Sault Ste. Marie to the Great Lakes Towing Company at Sault Ste. Marie, Mich., reporting his vessel ashore at Detour, hole in engineroom, pumps unable to keep vessel free of water, assistance requested. During the time preparations were being made to float the vessel, the Soo Station was in constant communication with the tug *Favourite*, alongside the *Mitchell*, and a number of messages were handled to various addresses. At 7 a.m. on the 9th July, the *Mitchell* was successfully floated and taken to Detour for repairs.

SS. *W. C. Franz*.—At 3 p.m. on the 11th July, 1922, the ss. *W. C. Franz* reported to Sault Ste. Marie that she had been in collision with the ss. *Shenango* off Valley Camp Coal Dock, Detour, Michigan. The report stated that stem and forepeak had been holed but collision bulkhead tight and vessel seaworthy. The *Franz* came to anchor until 2 p.m., July 12, when she proceeded to Collingwood for repairs. From the time of collision until the vessel's departure, messages were handled constantly through the Soo Station. No direct communication was established with the *Shenango*.

SS. *Noronic*.—At 11.45 a.m. on the 13th July, 1922, the Master of the ss. *Noronic* reported to his agent at Sault Ste. Marie, Ont., via the Soo Station, that his vessel had grounded at 8.00 a.m. on a sandy bottom, on the port side of Round Island Range, in upper Soo River. The vessel being unable to get off under her own steam two tugs were sent from Sault Ste. Marie. The ss. *Emperor* was also called upon to assist, and with the tugs, floated the *Noronic* at 8.00 a.m. on the 14th. Examination showed vessel undamaged and able proceed. During entire time vessel was aground constant communication was maintained with the Soo Station.

SS. *L. Ford*.—At 1.15 p.m. on the 2nd August the W/T operator on board the ss. *Harmonic* received a message from the ss. *L. Ford* addressed Great Lakes Towing Company, Sault Ste. Marie, Mich., advising ashore near Black Lake, off Iroquois point, St. Mary's river, and requesting tug to assist. Tugs were despatched and the *Ford* was released on the same date.

SS. *Arcturus*.—At 10.16 a.m. on the 16th August, 1922, Point Edward received a report from the tug *Favourite* advising ss. *Arcturus* disabled in the middle of the channel of Mammoa, Judd island, and a danger to navigation. This information was broadcasted and a report sent to the Marine Agent. At 1.30 p.m. the *Favourite* advised she had the *Arcturus* in tow.

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SS. *Kearsarge*.—At 7.00 a.m. on the 24th August, 1922, the ss. *Kearsarge* grounded on Yeo island, in the vicinity of Tobermory station. The *Kearsarge* was not equipped with wireless, but sent a party ashore in a small boat, which arrived at Tobermory station at 3.00 p.m. Notice of the grounding was immediately despatched to the Agent of Marine and Fisheries and arrangements made for tugs to assist. The *Kearsarge* was released at 4.00 p.m. on 27th August and proceeded to Depot Harbour under own steam.

SS. *W. D. Matthews*.—At 1.05 p.m. on the 7th October, 1922, the ss. *W. D. Matthews* reported to Midland that she was aground on west bank Hove island, weather foggy. Constant communication was maintained until the vessel was released at 2.20 a.m. October 10th, when she proceeded to Midland.

SS. *Cephans*.—At 12.45 a.m. on the 16th October Point Edward was advised by the ss. *Riverton* that an American steamer was aground off Port Lambton and that her stern was in the way of navigation. This information was immediately reported to the Marine Agency at Parry Sound and also broadcasted at intervals. At 10.00 a.m. same date, Point Edward was advised by the tug *Farouite* that the name of the vessel was *Cephans* and that the tug *Hardy* and a lighter were trying to release her. The *Cephans*, not being equipped with W/T, was not in direct communication with Point Edward. This vessel was finally released and proceeded.

SS. *McKinstry*.—On the 23rd October, 1922, the U.S.S. *Amarandth* informed Port Arthur that the ss. *McKinstry* had drifted ashore off Traverse island in dense fog. The *Amarandth* released the *McKinstry* and both vessels reached Portland canal.

SS. *Paisley*.—At 1.10 a.m. on the 5th November, 1922, the ss. *Paisley* grounded while coming out of Byng inlet, in the vicinity of the Tobermory Station. The *Paisley* got off under own steam, not equipped with W/T.

SS. *Glenisla*.—At 1.05 p.m. on the 11th November the ss. *Glenisla* grounded 4 miles outside of Whitefish point during a fog. At 2.06 p.m. the Master reported by radio through Sault Ste. Marie to his owners at Midland. Constant communication was maintained between the *Glenisla* and the Soo Station until the vessel was released at 10.20 a.m. 12th November.

Tug *Reliance*.—At 9.44 a.m. on the 13th December, 1922, the tug *Reliance* reported to Sault Ste. Marie as being on rocks at Preacher island, propeller gone. At 10.48 a.m. she reported badly in need of help, ship pounding heavily. This was last report received by W/T. About noon December 18th, tug *G. R. Gray* took off 23 survivors of crew.

SS. *Emperor*.—At 10.00 a.m. on the 16th December the ss. *Emperor* reported to Point Edward, aground at Bar point in St. Clair river. A message was despatched requesting that tug *Home Rule* from Amherstburg be sent to assist. The *Emperor* was released at 5.00 p.m. same day.

SS. *Benmaple*.—At 5.45 p.m. on the 18th December, 1922, Point Edward received a message from the ss. *Collingwood* advising the ss. *Benmaple* aground at lower end of St. Clair canal, assistance required. The owners at Port Colborne immediately sent tugs and at 3.00 p.m., 20th December, the vessel was released.

SS. *Sangstad*.—On the 6th June, 1922, the Norwegian steamer *Sangstad* reported to Cape Sable that she had grounded at Seal island but came off shortly afterwards at 6.15 p.m. No assistance necessary and no distress message sent out.

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GENERAL

Sailing Ship *France*.—At 20.15 o'clock Australian time on the 12th July, 1922, the ss. *Canadian Transporter* received a distress message from the sailing ship *France*. An immediate response was made giving the *Transporter's* position at 8.00 p.m., but no reply was received until 22.00 o'clock. The *Transporter's* position was then sent again, together with a message from the Commander to the effect that he was proceeding at full speed to assist, the distance from the distressed vessel being then 22 miles. At 3.50 a.m. on the 13th the *France* reported she was on reefs at New Caledonia island, also that an effort would be made to get crew off with own boats at daylight. The *Transporter* replied asking if assistance required. The *France* reported nothing further could be done as vessel was total loss. The *Transporter* thereupon resumed her course.

ASSISTANCE RENDERED TO SHIPS DURING THE YEAR BY GOVERNMENT DIRECTION

FINDING STATIONS

SS. *Canadian Commander*.—On the 23rd July, 1922, Chebucto Head D.F. intercepted a distress message from the ss. *Canadian Commander* ashore near St. Pierre, Miquelon. Bearings were taken from Cape Race D.F. and Canso D.F. Halifax Dockyard advised. Ship floated.

SS. *Helder*.—On the 15th January, 1923, Chebucto Head D.F. intercepted a distress message from the ss. *Helder* advising in need of immediate assistance, position 47.39 N., 43.24 W. Halifax Wireless Officer advised. Position broadcasted by Cape Race, signals too weak for bearings.

SS. *Moncenissio*.—On the 15th February, 1923, Chebucto Head D.F. intercepted a report from the ss. *Rosalind* advising ss. *Moncenissio* sinking in Lat. 36.35 N., 65.22 W., ss. *Carplaka* 77 miles distant proceeding assistance, nearest ship take action. The American Station at East Hampton, N.Y., handling this distress call. Halifax Wireless Office and Agent M. & F., St. John, N.B., advised by Chebucto Head and St. John, N.B., D.F., respectively.

Schooner *Puritan*.—On June 25th and 26th, 1922, Canso D.F. gave a series of cross bearings with Chebucto Head to the U.S.S. *Tampa* searching for missing dories and crew from the American schooner *Puritan* wrecked on Sable island.

SS. *Guilia*.—On the 20th March, 1923, Canso D.F. received a distress message from the ss. *Guilia*, position 41.37 N. 58.28 W. Bearing Canso D.F. 143°, Chebucto Head D.F. 123, both approximate. Steamers *Westlake* and *President Wilson* steaming for distressed vessel. Position of *Guilia* given to and bearings taken with Chebucto Head on both vessels. The *President Wilson* reported crew taken off, vessel sinking. This distress message was also heard by St. John, N.B., D.F., who obtained bearings on *Guilia* and *President Wilson* and reported same to Chebucto Head. St. John also advised the Agent M. & F. at St. John, N.B.

Trawler *Andre Pierre*.—On the 8th August, 1922, the position of the French trawler *Andre Pierre*, ashore on Miquelon island, was sent through the Galantry coast station, St. Pierre, as this vessel was unable to work direct with Cape Race D.F. Vessel total loss, crew saved.

NEW CONSTRUCTION, ADDITIONS AND ALTERATIONS

West Coast

Alert Bay.—Improvement to water supply was made and a new type of relay key, made up at the wireless workshop, was installed. The tramway was repaired.

Bull Harbour.—A new plunger pump was made up and installed.

Dead Tree Point.—New receiving gear was made up and installed. The old two piece mast was found to be in a dangerous condition and was cut down. A new aerial was erected and attached to a suitable tree.

Digby Island.—A 2,200 V. H.T. 3 phase power line was built from Prince Rupert to a point opposite Digby island. From this point a 3 wire H.T. cable has been run across to Digby island where it is carried to transformers and transformed to 550 V. The 550 line is strung on poles to a terminal pole near the W/T operating house. On the terminal pole two transformers were erected and the 550 V. again transformed down to 110 V. to feed all the lighting circuits of the dwelling houses and the operating house. The 550 V. line was also run into a switchboard in the operating room to feed any power circuits that may be necessary. From the switchboard the power line was run to two new transmitting transformers in the engine room. The transmitting gear in the engine room was rearranged to operate off the new transformers. Two new non-synchronous motor driven spark gaps were made up in the W/T workshop and installed. With the increased power (5 KW.) it was necessary to install a $\frac{1}{2}$ H.P. motor, larger disc and larger L.F.I.C. choke, the latter to tune the primary of the new transformers. One of the engine driven 2 KW. sets has been dismantled and shipped to the W/T workshop. All the buildings were wired for electric light. A Tungar rectifier was installed for charging the valve batteries. A considerable amount of plumbing work was done. An electric driven pump and pressure tank was installed. Three new hand force pumps were installed in the basement of each house to pump water up from the cement storage tanks to the house tanks in the attics. Hot water tanks were installed in the kitchens of each house and hot water backs fitted to the stoves. The hot water was connected to the sinks, baths and wash basins. In the single dwelling a water tank and new bath were installed and a tile drain was put down to carry away waste. The old dilapidated addition in rear of single dwelling was pulled down and a new one built for the present toilet. All windows were re-puttied and broken glass replaced. All buildings received two coats of paint, roofs stained red and necessary repairs effected. All plank sidewalks were repaired. The tramway track was practically rebuilt, the masts were overhauled and put into good shape. A sixteen-foot well was dug and cribbed in. All telephone and telegraph lines were overhauled and put into good shape.

Estevan Point.—All interior and exterior woodwork in power house was completed and given three coats of paint. All necessary shelving and work benches were put up in the storeroom and workshop. A toilet and wash basin were installed, water connected up and the waste carried away through a tile drain to a septic tank. All necessary engines and machines were erected and wired up to charge the 1,500 A.H. battery. This battery has been installed and is now in operation. A water tank and water cooling tower for cooling the jacket water from the 50 H.P. semi-diesel engine was built. Three large fuel storage tanks were set up near the power house. All the necessary machines and apparatus for the Type 1 set were installed and wired up, the set now being in

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full operation. The old operating house was completely repaired and repainted inside and outside. New receiving gear was installed and wired up. A new 100-foot D.F. mast was erected together with four field poles to work in connection with it, and D.F. aerial and D.F. receiving gear have been set up to overcome interference. A new receiving set for C.W. reception has also been installed and several tests carried out in connection with C.W. Reception. A complete new earth system of plates and radiating wires has been buried and connections made. A new 200-foot three-piece fir mast is being made to replace the old four-piece mast now considered unsafe. Two new transmitting aeriels were erected, one 1,000 meter aerial and one 600 meter aerial. A water still for supplying pure water to the battery has been installed.

The two new bungalows have been completed. The waste from each house has been run through a tile drain to a septic tank. A well 6 feet square and 20 feet deep was dug and a plentiful supply of good water obtained. A 1,000 gallon wooden water tank has been mounted on trestle with sufficient elevation to give a good pressure at all of the buildings. A 1½ H.P. gasoline driven pump was installed to pump water from the well to the tank. The water has been piped across to four dwelling houses and also to the power house and operating house.

All the old buildings and sheds were completely repaired and repainted. The 2-storey dwelling was reshingled and new gutters put up, all broken glass replaced and the back porch rebuilt. A new bath and sink were fitted and connected up to a new drain. The old small single dwelling was repaired and painted inside and outside. The old car shed has been moved and fixed up to house the fire engine and still. A new car shed was built at the back of the power house. The bunkhouse, 20 feet by 12 feet, built during the reconstruction of the station has been converted into a storage shed for rope and other material.

Gonzales Hill.—The old 3-piece mast, being rotted at the base, was taken down and a new 3-piece fir mast erected in its place. The interior walls of the operating room were relined with cottonwood pannelling, revarnished and ceiling painted. A new operating table was built and all receiving gear rewired. A new C.W. receiver and experimental C.W. transmitter were made up and installed. The switchboards have been rewired. A Tungar rectifier for charging the valve batteries was installed. Separate meters were installed for the power and lighting circuits. The dwelling and operating houses were painted outside. The two masts were painted.

Point Grey.—The plumbing was overhauled and put in good shape. New drains and a new vent were put in and an extra tile drain put down to carry away waste from the septic tank. A new chimney was built to enable the stove to be used in the kitchen and also to carry away the smoke from a heater placed upstairs for heating the bedrooms. The masts were overhauled and painted.

Naval Barracks.—Estimates for telephone and lighting lines were completed and a considerable amount of inspection of lighting circuits carried out.

Skidegate Inlet.—A survey of the inlet was made for a suitable site for a wireless station.

Stewart, B.C.—Prospective sites suitable for a wireless station were inspected and recommendations made regarding the erection of a station at this point.

East Coast

Barrington Passage.—The Admiralty having decided to close down Bermuda, Barrington was officially closed 11th August, 1922. Previous to closing the steel towers were thoroughly scraped and painted and all concrete foundations and anchor blocks overhauled and given a coating of tar for protection. All station buildings and dwellings exteriors painted. Particular attention was given to the batteries which were completely dismantled all plates being carefully stored in power house and acid in containers. If necessary station can be re-opened on short notice. Caretaker left in charge.

Point Amour.—An addition 15 feet by 22 feet was built to the western end of the old station building. In this was installed the two power sets taken from the Point Riche and Cape Ray Stations. A concrete water tank was erected under the engineroom to provide storage for 160 gallons of water. This is required during the winter months as no water is available locally during that period. A new earth system and aerial were also installed.

Chabucto Head D.F.—The station buildings were painted and a new aerial erected. The mast was painted and new bands fitted, the stays tarred and jury-masts fitted with new counterweight ropes, guide and chafing irons. A reservoir with an approximate capacity of 40,000 gallons was located close to the O.I.C.'s residence. This was made possible by raising the level of the brook nearly 3 feet 6 inches. This reservoir was connected to the house distributing system by means of a hydraulic ram, supplying on a 25-foot head, 20 gallons of water per hour, to a height of 20 feet above the brook level. About six yards of concrete and stone were used in construction of this dam. In the O.I.C.'s house, a bath, toilet, lavatory, kitchen sink and hot and cold water system were installed. Sewage was taken to a point on the shore at near high water level.

A building for the storage of coal was erected near the station residence and constructed in such a way that coal could be dumped through the roof as received in bags from the shore, thereby eliminating leaving the coal outdoors during the winter with attendant loss thereby. Provision was made in one end of this building for storage of lubricating oil and rigging accessories.

Canso, D.F.—The old Hart Lead battery, worn out, was dismantled and a 90-cell B6 Edison battery installed. A new cylinder, piston, crankshaft, main bearings and connecting rod were fitted to the Meitz and Weiss engine, practically rebuilding same. Extension fitted to exhaust pipe of engine and roof collar fitted. The aerial was replaced and rigging overhauled. New jury-mast irons were put up and mast painted white, rigging overhauled, tarred and painted.

Cape Race.—New bands were fitted, aerial replaced and rigging overhauled.

St. John, N.B., D.F.—New mast bands were fitted, aerial replaced and rigging overhauled.

APPROPRIATION AND EXPENDITURE

The parliamentary appropriation for the Marine Department for the fiscal year 1922-23, was \$7,593,948.54; the expenditure \$6,646,402.13; leaving an unexpended balance for the department of \$947,546.41.

CORRESPONDENCE

The number of letters received during the fiscal year 1922-23 was 116,631 as against 118,080 in 1921-22, a decrease of 1,449.

The number sent out was 33,000 as against 41,500 in 1921-22, a decrease of 8,500; in addition 8,000 circular letters inviting tenders, etc., were despatched.

This does not include letters received and sent out by the new branches transferred from the Naval Service, a number of which passed through the Central Registry.

NEW LEGISLATION

During the parliamentary session of 1923 new legislation affecting the department was enacted as follows:—

13-14 George V—Chapter 5—An Act to amend the Canada Shipping Act (Examinations of Masters), section 487, assented to June 13, 1923.

13-14 George V—Chapter 26—An Act to amend the Radiotelegraph Act, paragraph (a) of Section 10, assented to June 13, 1923.

13-14 George V—Chapter 29—An Act to provide for further advances to the Vancouver Harbour Commissioners, assented to April 13, 1923.

13-14 George V—Chapter 35—An Act to amend the Canada Shipping Act (Foreign Control), assented to June 30, 1923.

13-14 George V—Chapter 36—An Act to amend the Canada Shipping Act (Coasting Laws) Section 958, assented to June 30, 1923.

13-14 George V—Chapter 59—An Act to provide for further advances to the Montreal Harbour Commissioners, assented to June 30, 1923.

13-14 George V—Chapter 71—An Act respecting the Three Rivers Harbour Commissioners.

STEAMBOAT INSPECTION

The report of the Chairman of the Board of Steamboat Inspection is published as a supplement to the annual report.

A. JOHNSTON,
Deputy Minister of Marine and Fisheries.

